TWIN-TURBINE CENTRIFUGAL COMPRESSOR

SERVICE MONITORING TOOLS USER MANUAL

Danfoss Turbocor Compressors Inc.

M-SM-001-EN Rev. C
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Service Monitoring Tools Software System - License 3
List of Changes 13
1 Service Monitoring Tools Overview 14
1.1 Service Monitoring Tools Suite 14
1.2 Compatibility Requirements 14
1.3 SMT Suite Launcher Strip Tool Options 15
1.4 General Usage 18
1.5 Running a Simulation 21
1.6 Using the Remote Serial Multiplexer 27
2 Compressor Connection Manager 28
2.1 Accessing the Compressor Connection Manager 28
2.2 Establishing a Connection with a Compressor 29
2.3 Closing an Established Connection 32
2.4 Detecting Compressor Settings 32
2.5 Changing Compressor Access Levels 33
2.6 Synchronizing the Compressor Real-Time Clock with a PC Clock 33
2.7 Viewing a List of Recent Compressor Connection Settings 34
2.8 Compressor Connection Manager Layout 34
2.9 Connection Status Indications 35
2.10 RAM Only and RAM & EEPROM Check boxes 36
3 ModComm Tool 37
3.1 Accessing the ModComm Tool 37
3.2 Register-Parameter Tooltips 38
3.3 Changing the Current Register Watch Range 39
3.4 Toggling Between the Specified Watch Range and All Currently Polled Register Watches 40
3.5 Making a Single Write Request 41
3.6 Changing the Current Data Interpretation View 42
4 Active Alarm/Fault Viewer 43
4.1 Accessing the Active Alarm/Fault Viewer Tool 43
4.2 Viewing and Configuring Alarm/Fault Limits and Lockout Settings 45
5 Compressor Monitor 46
5.1 Accessing the Compressor Monitor 46
5.2 View Options 47
5.3 Changing the Demand 47
5.4 Changing the IGV Opening 47
5.5 Changing the Desired Motor Speed 48
5.6 Levitating or De-levitating the Shaft 48
6 Logged Event and Fault Viewer 49
6.1 Accessing the Logged Event and Fault Viewer 49
6.2 Applying Filters for Data Retrieval and Watching 50
6.3 Retrieving Logged Event and Fault Data 51
6.4 Watching for New Logged Event and Fault Data 51
6.5 Viewing Logged Events and Faults Details 51
6.6 Exporting Logged Event and Fault Data to a File 52
6.7 Importing Logged Event and Fault Data 52
6.8 Viewing the Fault Occurrence Counters 52
6.9 Viewing Runtime History Data 52
6.10 Viewing Application Help Information 53
7 Compressor Data Recording and Playback Tool 54
7.1 Launching the Compressor Data Recording and Playback Tool 54

7.2 Recording 55
7.3 Playback ... 59
8 Bearing Calibration Tool ... 66
8.1 Accessing the Bearing Calibration Tool ... 66
8.2 Performing a Calibration ... 68
8.3 Performing a Validation ... 69
8.4 Saving the Latest Bearing Calibration for Temporary Use ... 69
8.5 Saving the Latest Bearing Calibration for Persistent Use ... 69
8.6 Viewing Bearing Calibration or Operation Settings ... 70
8.7 Creating a Calibration Report ... 70
9 Chiller and Analog Configuration Tool ... 71
9.1 Accessing the Chiller and Analog Configuration Tool ... 71
9.2 Viewing or Modifying Chiller Controller Settings ... 72
9.3 Viewing or Modifying Analog Output Controller Settings ... 73
10 EXV Configuration Tool ... 74
10.1 Accessing the EXV Configuration Tool ... 74
10.2 Viewing and Modifying EXV Controller Settings ... 75
11 BMCC System Configuration Tool ... 77
11.1 Accessing the BMCC System Configuration Tool ... 77
11.2 Viewing Compressor Identification Settings ... 78
11.3 Viewing or Modifying Communication Settings ... 78
11.4 Viewing Power Settings ... 78
12 Compressor Configuration Tool ... 79
12.1 Accessing the Compressor Configuration Tool ... 79
12.2 Viewing or Modifying Compressor Operation Settings ... 80
12.3 Viewing or Modifying Compressor Startup Settings ... 81
12.4 Viewing or Modifying IGV Configuration Settings ... 81
12.5 Viewing or Modifying Surge/Choke Configuration Settings ... 81
13 Compressor Commissioning Tool ... 82
13.1 Accessing the Compressor Commissioning Tool ... 82
13.2 Importing a Commissioning Configuration from a File ... 83
13.3 Adjusting Commissioning Parameters Requirement Step ... 83
13.4 Exporting a Commissioning Values Configuration to a File ... 84
13.5 Signing an Existing Commissioning File ... 85
13.6 Exporting Commissioning Parameter Values to a Signed File ... 85
13.7 Exporting Commissioning Parameters to a Connected Compressor ... 86
13.8 Creating a Commissioning Report ... 87
14 Compressor Data Trending Tool ... 88
14.1 Accessing the Compressor Data Trending Tool ... 88
14.2 Adding Parameters for Graphical Monitoring ... 89
14.3 Removing Parameters from Graphical Monitoring ... 90
14.4 Selecting the Plot Color a Specific Parameter ... 91
14.5 Starting Graphical Monitoring ... 92
14.6 Stopping Graphical Monitoring ... 93
14.7 Resetting Plot Data ... 94
14.8 Saving Plot Data to a CSV File ... 94
14.9 Loading a Saved or Pre configured Watch Group ... 95
14.10 Deleting a Saved or Pre configured Watch Group ... 96
14.11 Saving the Active Watch Configuration for Later Recall ... 96

15 Remote Serial Multiplexer 97
15.1 Settings 97
15.2 Configuration File 97

List of Changes

The following List of Changes tables contains all changes made from the preceding version of this manual (Rev C) to this version (Rev D).

Table 1 List of Changes

Page	Description
29	Updated **Figure 16** to show new Compressor Connection Manager Tool window containing RAM Only and RAM & EEPROM selections.
36	Added **Section 2.10** *RAM Only and RAM & EEPROM Check boxes*.
45	Updated **Figure 31** *Alarm and Fault Settings*.
46	Updated **Figure 33** *Compressor Monitor Tool Window*.
67	Updated **Figure 61** *Bearing Calibration Window*.
67	Added Note in Bearing Calibration section regarding RAM Only and RAM & EEPROM check boxes.
77	Updated **Figure 68** *BMCC System Configuration Tool Window*.
80	Updated **Figure 70** *Compressor Configuration Window*.
82	Updated **Figure 72** *Compressor Commissioning Window*.
84	Updated **Figure 73** *Compressor Commissioning Finish Window*.

1 Service Monitoring Tools Overview

1.1 Service Monitoring Tools Suite

The Service Monitoring Tools (SMT) Suite can be used to launch other tools and to view detailed version information for all tools included in the SMT (software system) software package.

The launcher strip contains at least one standard menu item, *About*, as well as menu items representing any tools included in the software package. The launcher strip will only display items which are accessible at any given time, typically dependent upon connection status and access level. This tool can be used to launch tools, view detailed version information for all tools included in the SMT software package, or change the launcher layout orientation.

Figure 1 SMT Suite Launcher Strip - Not Connected

Once connected, more tool icons may appear in the *SMT Suite Launcher Strip* depending on the compressor's established access level.

Figure 2 SMT Suite Launcher Strip - Connected

1.2 Compatibility Requirements

The SMT software requires the following environment for operation:

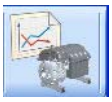
- Framework: .NET Framework Version 3.5 or later
- Operating System: Microsoft Windows XP (32-bit or 64-bit) SP2 or later, Microsoft Windows Vista (32-bit or 64-bit) Basic or better, or Microsoft Windows 7 (32-bit or 64-bit) Home Basic or better
- Hardware: 1.0 GHz or higher CPU, minimum OS-required RAM, 1024x768 high-color display (or better), and 20 MB or more available hard-disk space

1.3 SMT Suite Launcher Strip Tool Options

Depending on compressor acess level, the following tools may be available from the *SMT Suite Launcher Strip*:

Icon	Tool	Description
	About	The *About* tool displays a form showing OS and framework version information, SMT software system release product version info, and a listing of software assemblies loaded for the SMT software product. • To view a detailed description of any given assembly, select an item in the loaded assemblies listing and a text description and graphic icon (if exists) displays in the area below • To copy all of the version information to the clipboard, click the *Copy Info* button.
	Compressor Connection Manager	Discover and establish a means of communication with the compressor.
	ModComm Tool	Assists in troubleshooting a BMCC or monitoring registers by providing access to ModBus registers on a raw level.
	Active Alarm/ Fault Viewer	Instantaneously monitor the alarm and fault status of a connected compressor device and configure the alarm and fault limits.
	Compressor Monitor	Monitor the most commonly desired parameters of the BMCC related to motor, bearing, and compressor operation.
	Chiller and Analog Configuration	Allows you to view or modify the chiller control and analog output control configuration parameters and settings.

Icon	Tool	Description
	EXV Configuration Tool	This allows you to view and configure the electronic expansion valve configuration parameters and settings.
	Logged Event and Fault Viewer	Retrieve logged fault and event data regarding the operation of a connected compressor for the purpose of troubleshooting and diagnostics.
	Compressor Data Recording and Playback	Start and stop recording of any variables on the BMCC, as well as launch a server partially simulating an actual compressor using previously recorded data. The intended usage of this tool is not only for training, but for testing, evaluation and compressor troubleshooting purposes.
	Bearing Calibration	Execute a bearing calibration procedure and analyze the outcome.
	BMCC System Configuration	View and change many of the system settings of a BMCC which are not included within the scope of compressor, chiller, motor, bearing, etc. operation.

Icon	Tool	Description
	Compressor Configuration	View and configure the compressor operation, IGV startup, surge/choke, and other operational configuration parameters.
	Compressor Commissioning	View, modify and commit site-specific compressor parameter values of a connected compressor, as well as import and export configurations between portable files. Minor guidance is provided to the user by presenting any number of configuration pages which are necessary for consideration during the deployment of a compressor system and the displaying of basic coverage/flow indication.
	**Compressor Data Trending**	Graphically monitor selected compressor parameter values and load or save user-configurable watch configurations.

1.3.1 Right-Click Context Menu

From the SMT Launcher Strip, you can right-click with your mouse to view a context menu providing easy access to tasks, including:

- Launching a tool - select the desired tool by name.
- Display the *About* form - click **About**.
- Minimize the tool suite - click **Minimize** and the tool will be minimized to your task bar under one window button.
- Change the SMT Launcher Strip orientation - click **Alignment** -> **Horizontal** to display the SMT Launcher Strip in a landscape format or **Alignment** -> **Vertical** for a portrait layout.

1.4 General Usage

There are several helpful features common across all tools in the SMT software system geared toward simplifying day-to-day as well as extensive usage. These features include: internal logging system, informative tooltips, highlight-on-click, collapsible group boxes, interactive graphs, persistent user settings, interaction with the Remote Serial Multiplexer, normalized tool framework, and product update checking.

1.4.1 Internal Logging System

To enhance maintenance and troubleshooting the SMT software system, all tools utilize a common logging system functionality for outputting to file internal trace information, as well as any error occurrences which may occur

The log file is located at: `[My Documents]\Danfoss Turbocor\SMT\smt.log`

1.4.2 Informative Tooltips

To aid in general use and interpretation of compressor data, all compressor parameter edit/ display fields will display a tooltip which pops up if the mouse cursor is hovered over the field. The text displayed in the tooltip is a localized compressor parameter description including, depending on access level, the Modbus register address and any masks necessary for interpretation.

1.4.3 Highlight-on-click

To assist you in viewing data 'at a glance', certain readout fields can be highlighted to make them stand out from the rest. The highlighting of fields with this functionality enabled can be toggled by left-clicking on the desired field.

1.4.4 Collapsible Group Boxes

Any group boxes which display a box bearing a +/- box in the upper left-hand corner may be collapsed in order to reduce the size of a form when some information is not desired to be viewed. To collapse or expand these regions, left-click on the +/- graphic.

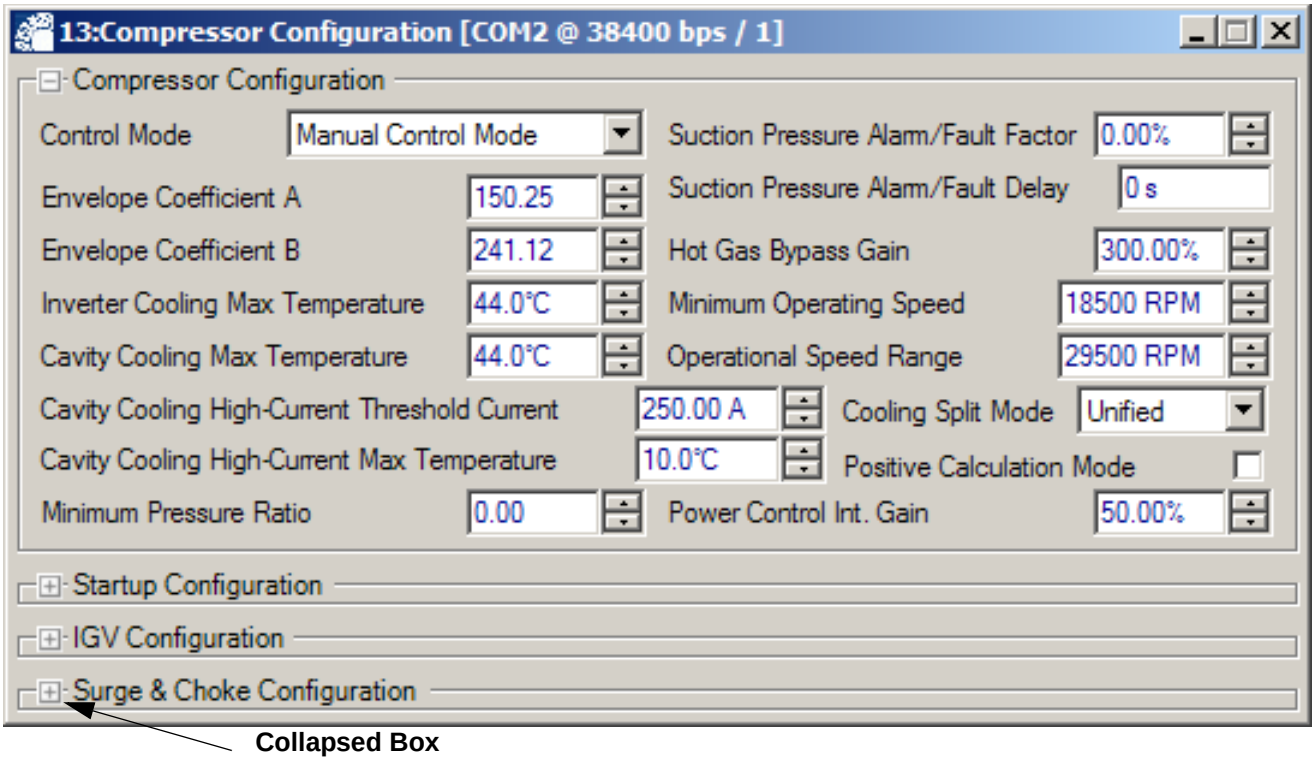


Figure 3 Collapsible Group Boxes Example

1.4.5 Interactive Graphs

Graphs are used to display some data in a way so as to provide a different perspective on data. With these views comes the need for panning, zooming, and etc.

- **To pan**: if panning is enabled, click and drag in either the X or Y direction
- **To fast pan:** hold the control key while clicking and dragging within a graph to pan across larger areas
- **To zoom**: if zooming is enabled, use the scroll wheel on the mouse to zoom in and out - holding shift while scrolling will only stretch the Y axis; holding ctrl while scrolling will only stretch the X axis
- **To reset to initial view:** double-click anywhere on the graph

1.4.6 Persistent User Settings

Many of the interface settings are saved in a local settings file in order to persist common settings on a user-by-user basis.

Typical persistent settings include: tool form screen location, tool form normal/maximized state, collapsible form collapse/expand states, user-entered application fields (i.e. hostnames, TCP ports, technician name fields, etc.).

The settings file is located at:
`[My Documents]\Danfoss Turbocor\SMT\Settings.xml`

1.4.7 The Remote Serial Multiplexer

The *Remote Serial Multiplexer* is a system which allows multiple applications to indirectly communicate with a single device connected to one serial port. In addition to local serial port multiplexing, this system can be used remotely. For example, machine A, which is connected to a compressor, may allow machine B to communicate with its compressor, although machine B is in a different building, so long as there is a network/Internet connection enabling communication between the two computers.

1.4.8 Normalized Tool Framework

All components considered to be tools contain a commonly-structured data identifying a tool and its interface components.

Data included in the tool metadata (assembly information) include: Tool Id #, Tool Name Id, Tool Description Id, Tool Classification, Minimum (execution) Access Level, Enumeration Count, Persistence, Connection Requirement, Dedication Requirement, and an Application Graphic.

In addition to the framework metadata, there are several components geared toward the utilization of these tool components, including standalone execution support, common interfacing components, etc.

1.4.9 Product Update Checking

To keep users informed of available updates, an automatic update check and notification can be enabled, which will indicate to the user if there is a newer version of the SMT software product available for download.

This process is performed by downloading the latest product information from a Turbocor website and comparing the indicated version against the current product version. To prevent possibly malicious modification of the product release notice, authentication can be performed by checking a required signature of the product info message using the assembly's public key, which is part of the same key pair used for signing the product release notice.

1.4.10 Tool Identification

Each tool's title frame contains information identifying it. This information includes:

- Tool/Form ID - The first number, indicating the ID number of the current tool
- Tool Title - The localized text title of the current tool
- Device Connection Info - This includes the serial port and baud rate or IP address and port number and the slave address of the device with which the current tool is connected.

NOTE
To differentiate between instances of the SMT, look at the device communication information displayed in the tool's frame.

1.5 Running a Simulation

While the SMT Suite Tools are intended to be used with live DTC compressors, it is possible to partially simulate communication with a compressor using recorded data. The playback simulation can be used for displaying values, but cannot accept write requests (parameter updates) and certain features may not be available (such as fault or event log retrieval).

When you first open the Service Monitoring Tools software, a limited version of the Service Monitoring Tools (SMT) Suite Launcher Strip is displayed.

Figure 4 SMT Suite Launcher Strip - Not Connected

1. Click the **Compressor Data Recording & Playback Tool** icon.

Figure 5 Compressor Data Recording & Playback Tool Icon

2. The *Compressor Data Recording & Playback Tool* window displays.

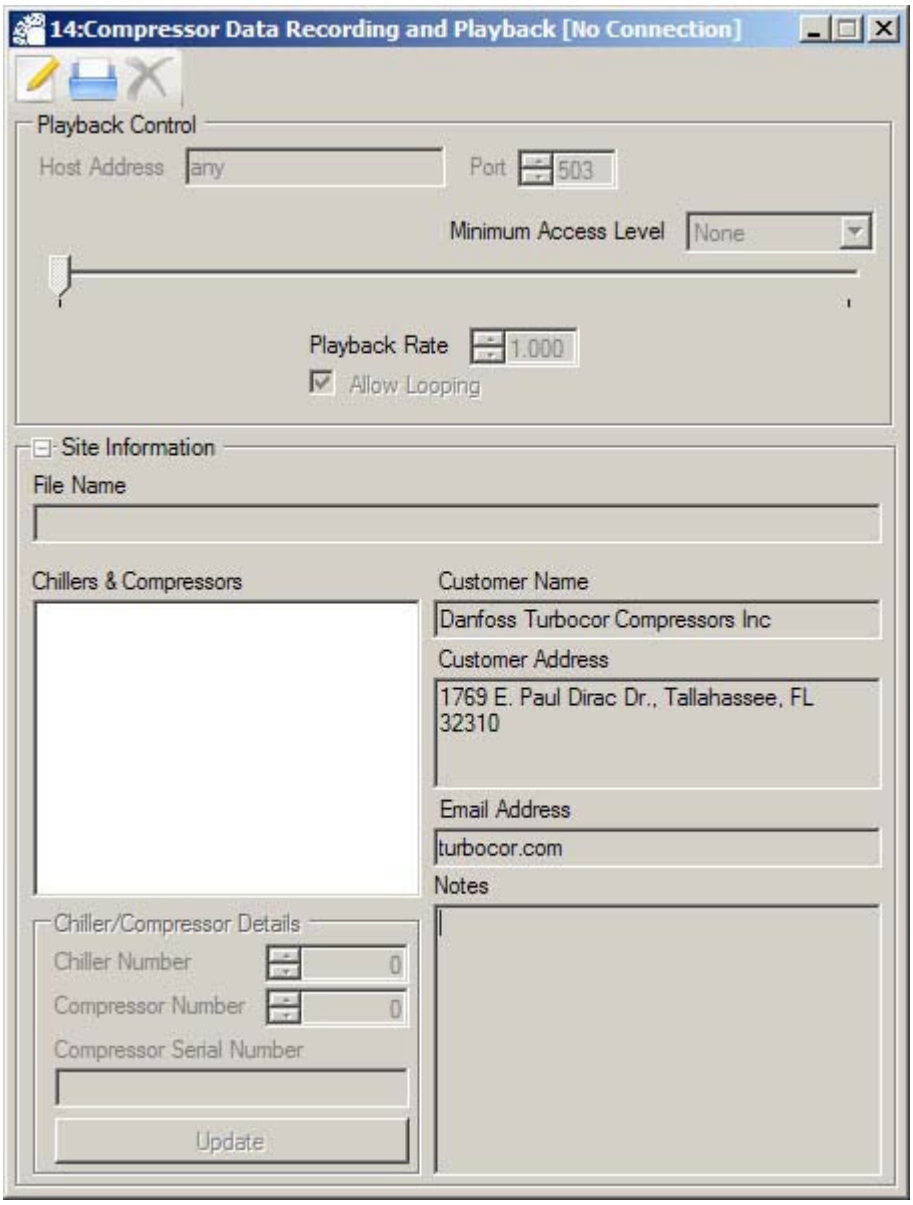


Figure 6 Compressor Data Recording and Playback Tool

3. Click the **Open Recording** icon.

Figure 7 Open Recording Icon

The *Choose a recording file to open* window displays:

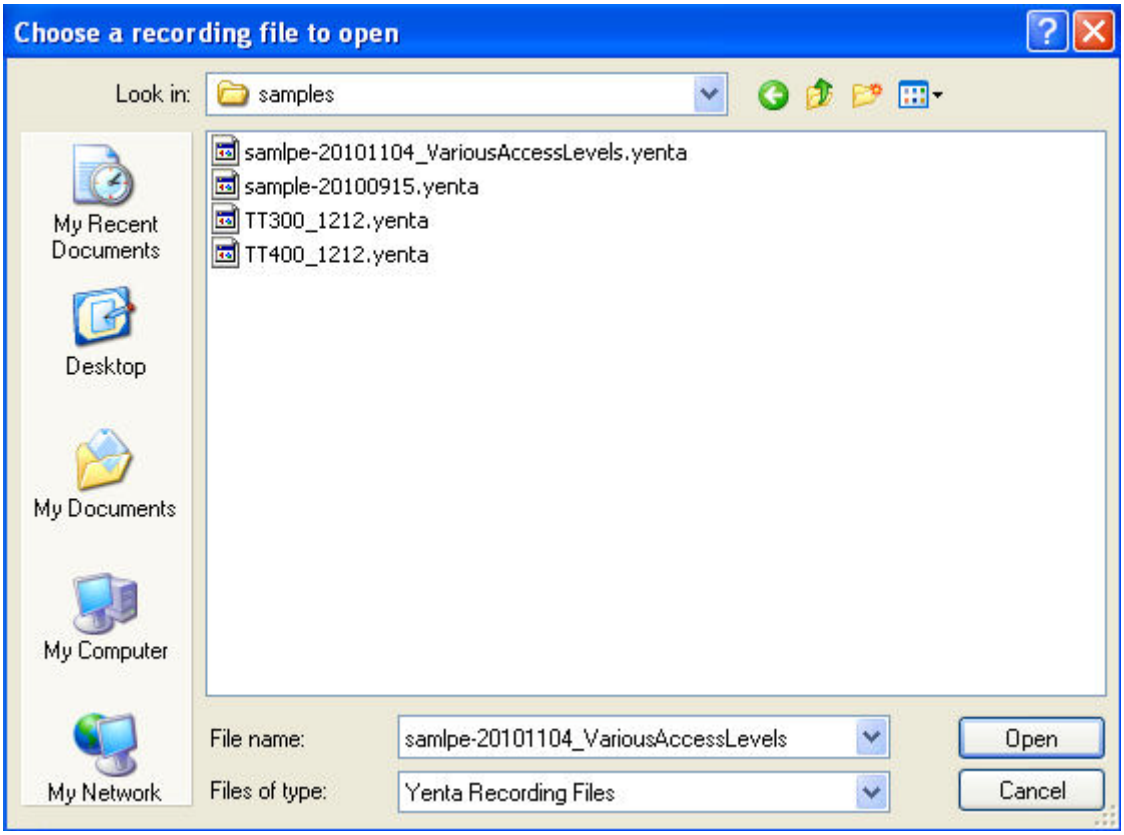


Figure 8 Choose a Recording File to Open Window

4. Select a **recording file,** and then click **Open**.

The playback host will automatically start when you connect to it. See **Figure 9**.

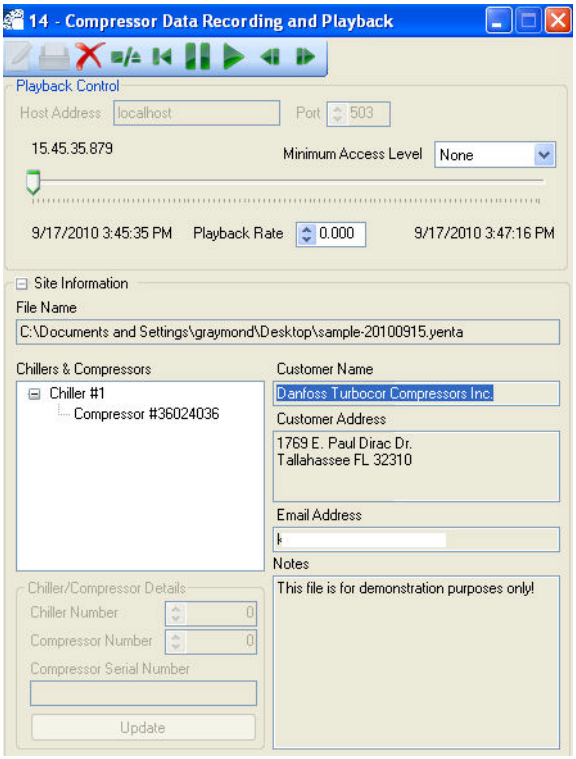


Figure 9 Compressor Data Recording & Playback Tool

5. If the playback control icons do not appear at the top of the *Compressor Data Recording & Playback Tool*, a window similar to **Figure 10** will display. **Complete steps a and b**; otherwise jump to step 6.

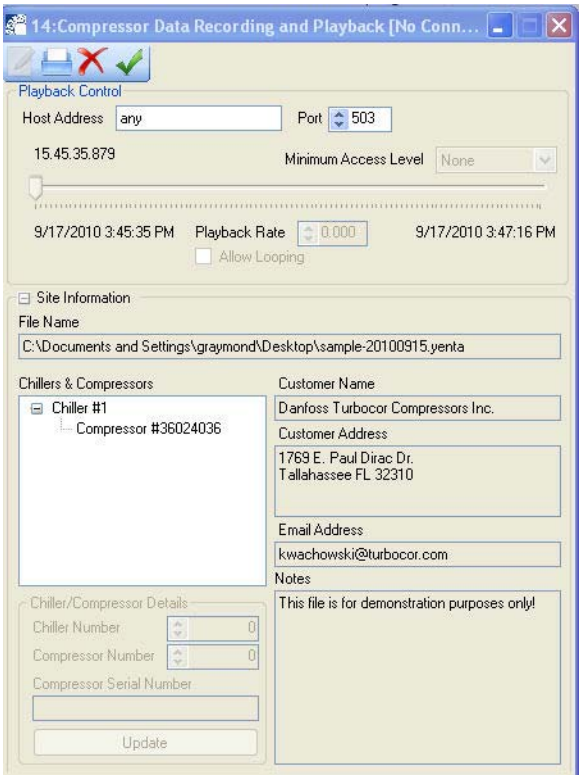


Figure 10 Compressor Data Recording and Playback Tool showing Launch Server

a. Check the settings of the *Host Address* and *Port* fields (default values are 'any' and '503') .

b. Click the **Launch Playback Server** icon . For more information, see **Section 7.1 "Launching the Compressor Data Recording and Playback Tool".**

Figure 11 Launch Playback Server Icon

6. Click the **Compressor Connection Manager** icon.

Figure 12 Compressor Connection Manager Icon

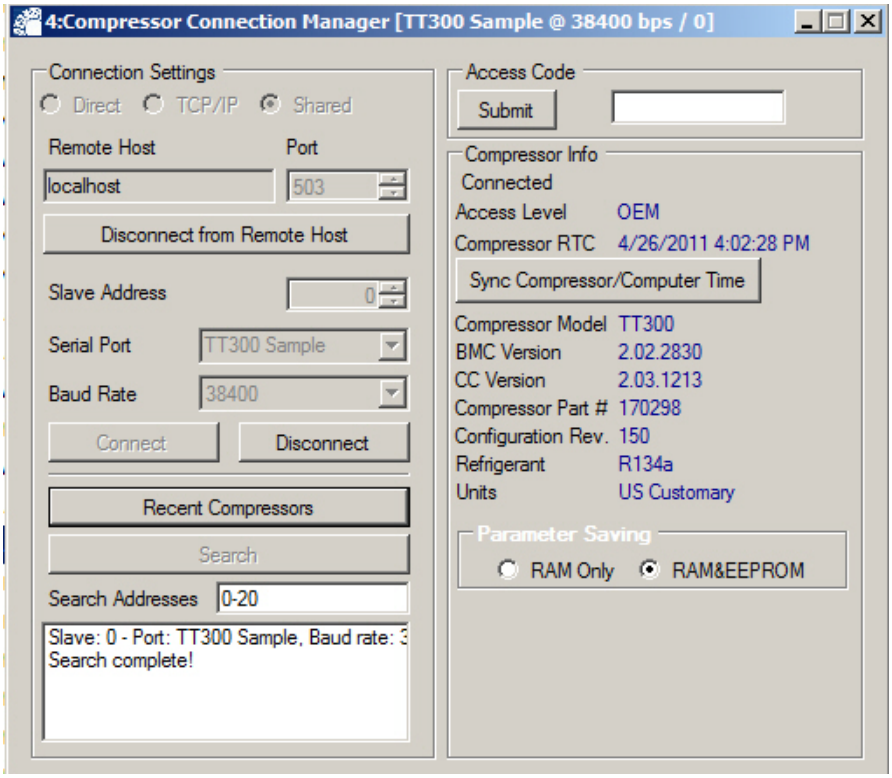


Figure 13 Compressor Connection Manager

7. In the *Compressor Connection Manager*, ensure that **Shared** is selected under the *Connection Settings*.

8. Ensure that the field labeled Port matches the Port filed displayed on the *Compressor Data Recording & Playback Tool* and that the field labeled 'Remote Host' says 'localhost'.

9. In the Compressor Connection Manager, click **Connect to Remote Host**.

   The items listed in the drop-down labeled *Serial Port* identify available compressor data streams - typically, the default (and most likely only) selection is sufficient.

10. Click **Connect.** You are now connected.

11. Type in an Access Code and click **Submit**. Depending on the compressor's established access level, more tool icons may appear in the *SMT Suite Launcher Strip.*

Figure 14 SMT Suite Launcher Strip - Connected

1.6 Using the Remote Serial Multiplexer

Key steps:

1. Start the Remote Serial Multiplexer

   a. From the command line:

      i For default settings (local only), execute RemoteSerialMultiplexer.exe.

      ii To specify settings, specify TCP port number [ServerPort] and host name/address [ServerAddress] - for remote, specify the machine's computer name or IP address [see Server.config for details] - and execute RemoteSerialMultiplexer.exe -c [filename].

   b. From the Start Menu (uses default settings): click **Start->Run->Programs->Danfoss Turbocor->Remote Serial Multiplexer.**

2. Connect to the Remote Serial Multiplexer

   a. Open Connection Manager and follow the steps in **Section 2.2.2 “Shared Connection”**.

2 Compressor Connection Manager

The *Compressor Connection Manager* is used to discover and establish a means of communication with a compressor. This tool can be used to establish a connection with a compressor, close an established connection, detect compressor settings, change compressor access level, synchronize the compressor real-time clock (RTC) with a personal computer (PC) clock, and view a list of recent compressor connection settings.

When a connection with a compressor is established, information detailing the compressor's current access level, BMC version, CC version, part number, configuration number, refrigerant type, unit system, and current real-time clock readout are displayed as well as the current connection status.

2.1 Accessing the Compressor Connection Manager

NOTE
Please see **Section 1.5 "Running a Simulation"** if you wish to evaluate the software without connecting to a compressor.

1. Click the **Compressor Connection Manager** icon.

Figure 15 Compressor Connection Manager Icon

The *Compressor Connection Manager* window displays:

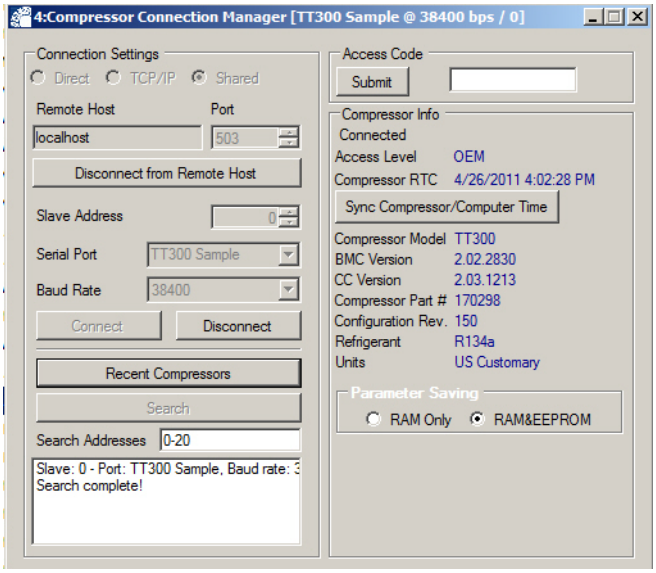


Figure 16 Compressor Connection Manager

2.2 Establishing a Connection with a Compressor

To establish a connection with a compressor:

1. From the to *Connection Settings* group, select a connection type:
   - **Direct** for direct use of the serial port. This is the default recommended setting.
   - **Shared** for indirect use of a serial port, allowing multiple applications access to the same compressor via the same serial port
   - **TCP/IP** for communication with a Modbus TCP compressor interface

2. If using Shared or TCP/IP, enter your **shared host name and TCP port number** - usually the default values (localhost and 502) are fine.

   a. For a Shared Connection, see **Section 2.2.2 "Shared Connection"**.

   b. For TCP/IP, see **Section 2.2.3 "TCP/IP Connection"**.

   c. For a Direct Connection, see **Section 2.2.1 "Direct Connection"**.

2.2.1 Direct Connection

1. From the *Connection Settings* group, select **Direct** as your connection type.

2. Select the **serial port name** to which the compressor is connected from the *Serial Port* drop-down list.

NOTE
The Serial Port listing only shows serial port names which currently exist on the local/host machine.

3. Do one of the following:

   a. If the slave address and baud rate are known: enter the **known slave address** in the *Slave Address* field and select the **known baud rate** from the *Baud Rate* drop-down and click **Connect** - a connection should now be established

   b. If the slave address or baud rate are unknown, enter a **slave address search range** or **list of values to test for detection** in the *Search Addresses* field and click **Search**.

      After a short period of time (the less addresses to check, the quicker the search will be), the search results containing a list of communication setting combinations display in the *Search Addresses* field.

      Double-click any of the **communication setting combinations** to automatically connect using the those settings. A connection should now be established.

      If no compressors are detected, *No compressors found!* will display in the listing.

4. Type in your *Access Code* and click **Submit.**

2.2.2 Shared Connection

To enter a Shared connection:

1. From the to Connection Settings group, select **Shared** as your connection type.
2. Enter your **shared host name** and **TCP port number** - usually the default values are fine.
3. Click the **Connect to Remote Host** button.
4. Select the **serial port name** to which the compressor is connected from the Serial Port drop-down box.'
5. Do one of the following:
   a. If the slave address and baud rate are known: enter the **known slave address** in the *Slave Address* field and select the **known baud rate** from the *Baud Rate* drop-down and click **Connect** - a connection should now be established
   b. If the slave address or baud rate are unknown, enter a **slave address search range** or **list of values to test for detection** in the *Search Addresses* field and click **Search**.

      After a short period of time (the less addresses to check, the quicker the search will be), the search results containing a list of communication setting combinations display in the *Search Results* listing.

      Double-click any of the **communication setting combinations** to automatically connect using those settings. A connection should now be established If no compressors are detected, *No compressors found!* will display in the listing.
6. Type in your Access Code and click **Submit.**

2.2.3 TCP/IP Connection

1. From the *Connection Settings* group, select **TCP/IP** as your connection type:
2. Enter the slave address in the *Slave Address* field.
3. Click **Connect**.

   A connection should now be established.
4. Type in your Access Code and click **Submit**.

2.3 Closing an Established Connection

To close an established connection:

1. Click the **Disconnect** button.

2. To also disconnect from a remote host (such as the C*ompressor Data Recording & Playback* tool's playback host or the *Remote Serial Multiplexer*), click the **Disconnect from Remote Host** button. The tool will close any connections established and data polling will stop.

2.4 Detecting Compressor Settings

To detect compressor settings:

- Enter a **slave address search range** or **list of values to test for detection** in the *Search Results* listing and click the **Search**.

  After a short period of time (the less addresses to check, the quicker the search will be), the search results display in the *Search Addresses* field. If no compressors are detected, *No compressors found!* will display in the listing; otherwise, communication setting combinations will display.

2.5 Changing Compressor Access Levels

NOTE
On connection, the SMT requires a valid access code in order to allow access to the various tools available at the given access level. A user must not change the access level of the BMCC to a lower than 2 if the compressor is being controlled by Modbus. If the access level is lower than access level 2, the compressor can not accept a demand write. For example, if the lowest level that a compressor can accept a demand write is at 2-Low, then on submission of a “0” in the Access Code field, the SMT will revert to a read-only state and the compressor will not accept writes to demand from the Modbus controller. In this case, the compressor access level should be left at 2-Low or higher.

To change the compressor access level:

1. Enter the **desired access code** in the *Access Code* field and click **Submit.**

   The tool will send the access code to the compressor and indicate the access level on the connected compressor.

   If the access code is incorrect: the compressor will bump its access level to *Basic*. After five failed access code change attempts, the compressor will no longer accept access codes and will require a power cycle before elevating access level will be possible.

NOTE
Since the access level on the compressor will remain beyond use of this software, be sure to either downgrade the access level or reset the compressor after completing service.

2.6 Synchronizing the Compressor Real-Time Clock with a PC Clock

To synchronize a compressor real-time clock (RTC) with a PC clock:

- Click the **Sync Compressor/Computer Time** button

  The tool will attempt to update the compressor's RTC to match the local computer's date and time to within ±500 ms.

2.7 Viewing a List of Recent Compressor Connection Settings

To view a list of recent compressor connection settings:

- Click the **Recent Compressors** button

  A list of recent compressor communication settings display in the *Search Results* listing

  If there is no connection history, *No compressors found!* displays in the listing; otherwise, communication setting combinations are displayed. Double-clicking any of the settings combination entries will automatically attempt to connect using the those settings.

2.8 Compressor Connection Manager Layout

The Compressor Connection Manager contains the following frames:

- Connection Settings:

  — Direct

  — TCP/IP

  — Shared

- Remote Host
- Port
- Connect/Disconnect from Remote Host button
- Slave Address
- Serial Port
- Baud Rate
- Connect/Disconnect button
- Recent Compressors button
- Search button
- Search Addresses box
- Access Code
- Submit button
- Compressor Info frame

2.9 Connection Status Indications

- Disconnected: no connection exists with a compressor or remote compressor host
- Ready to Connect: a connection with a remote host (if applicable) has been established, but no compressor connection has yet been established
- Compressor is starting up: The currently connected compressor is in startup mode
- Connected: There has been established a connection with a remote host (if applicable) and a connection with a compressor has been established and verified
- No compressor found: Any serial ports or connections have been established, but a valid compressor was not able to be detected
- Error opening port: There was an error opening the specified serial port (either the port is already in use, the port name doesn't exist, or there was some other error attempting to open the serial port)
- Server not found: Could not connect to remote host
- There was a time out during communication' (Error Time out): There was a timeout during communication
- Invalid response: The response received was invalid
- Received an error response: The host responded with an error
- Error: CRC mismatch: The received message has a CRC mismatch

2.10 RAM Only and RAM & EEPROM Check boxes

By default, changes made in the SMT are set to RAM & EEPROM.

If the RAM & EEPROM check box is clicked, all parameter changes are saved to persistent memory.

• • • CAUTION! • • •

Saving to RAM & EEPROM will commit all the current values to permanent memory and all previous values will be lost.

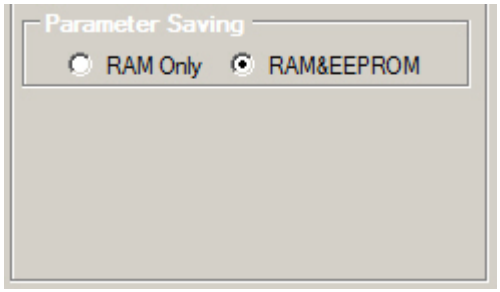


Figure 17 Parameter Saving Frame

The Parameter Saving frame is located in the lower right corner of the Compressor Connection Tool. See **Figure 16**.

NOTE

The Parameter Saving selection on the *Compressor Connection Manager* tool applies to the entire SMT.

3 ModComm Tool

The *ModComm Tool* assists users in troubleshooting a BMCC or monitoring extra registers by providing access to Modbus registers on a raw level. This tool can be used to change the current register watch range, toggle between watching the specified watch range and all currently polled register watches, make a single write request, and change the current data interpretation view.

3.1 Accessing the ModComm Tool

- Once connected, select the **ModComm tool icon** from the *SMT Suite Launcher Strip.*

Figure 18 ModComm Tool Icon

The *ModComm* window displays.

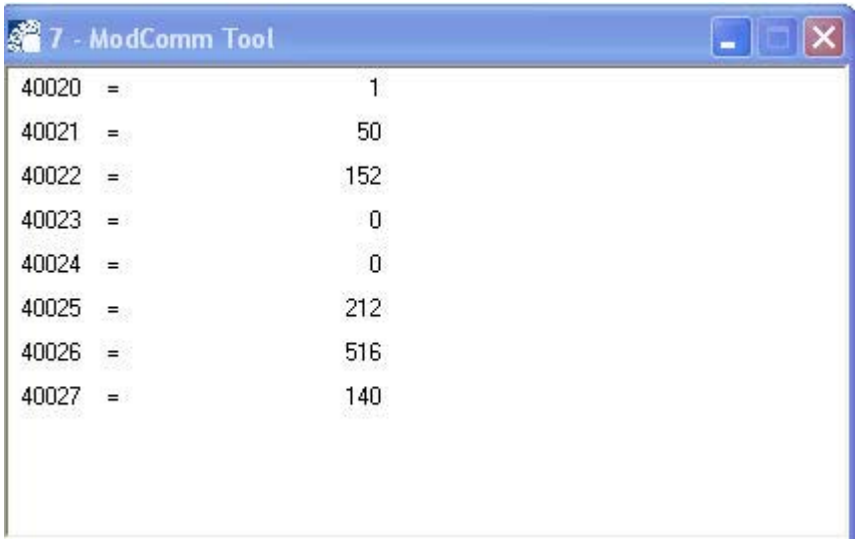


Figure 19 ModComm Window

3.2 Register-Parameter Tooltips

If you hover your mouse over any given register or parameter, a tooltip will display listing all parameter references for that register (if any exist).

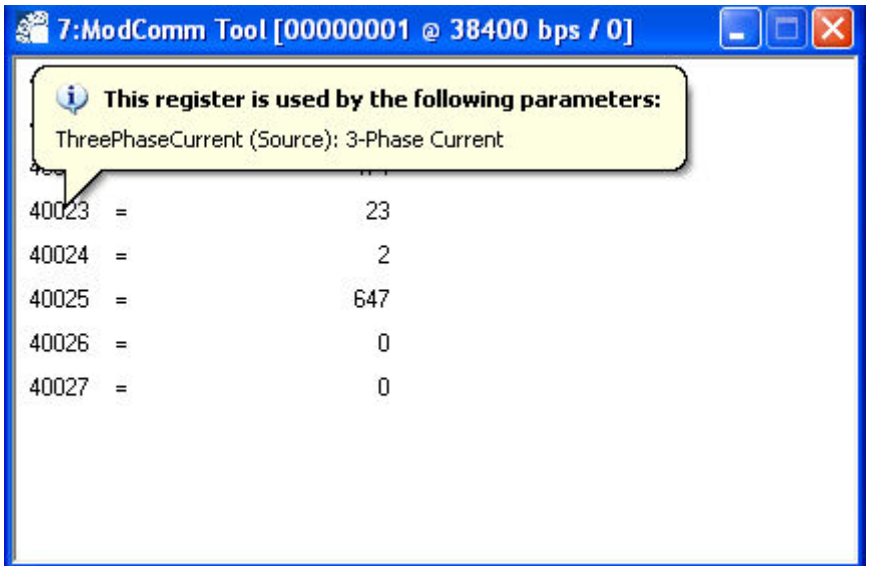

7:ModComm Tool [00000001 @ 38400 bps / 0]
This register is used by the following parameters:
ThreePhaseCurrent (Source): 3-Phase Current
40023 = 23
40024 = 2
40025 = 647
40026 = 0
40027 = 0

Figure 20 ModBus Tool Showing Register Tooltip

3.3 Changing the Current Register Watch Range

To change the current register watch range:

1. Right-click anywhere on the main form and the context menu will appear.

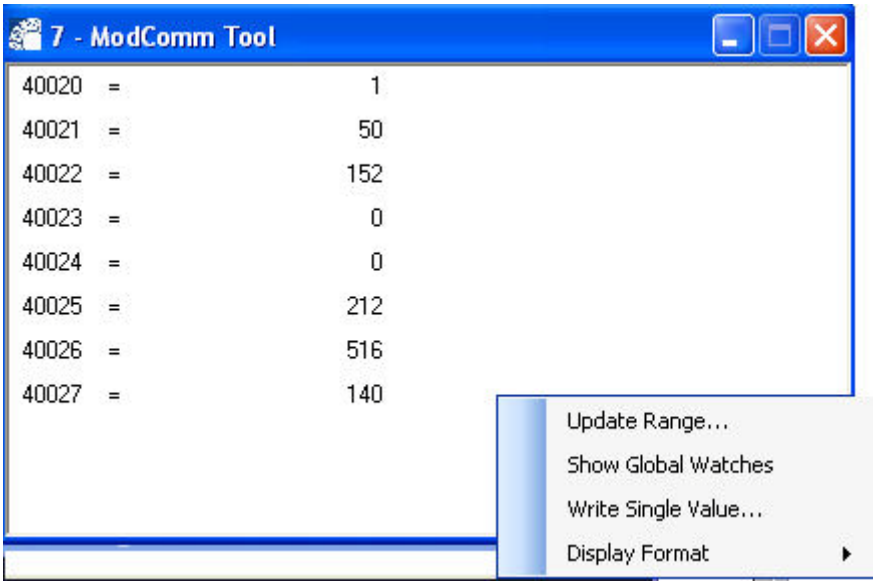


Figure 21 ModComm Window Displaying Menu

2. Select the **Update Range**. The *Update Watch Range* window displays:

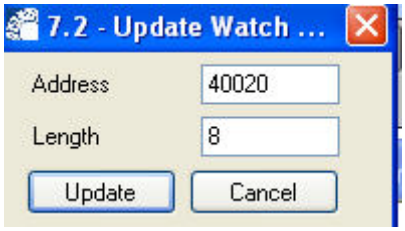


Figure 22 Update Watch Range

3. Enter a valid **start address** and **watch length.**

4. Click **Update** to dismiss the window and update the current watch range.

3.4 Toggling Between the Specified Watch Range and All Currently Polled Register Watches

To toggle between watching the specified watch range and all currently polled register watches:

1. Right-click **anywhere on the main form** and the context menu displays.
2. Check or un check **Show Global Watches** and the displayed Modbus registers will change.

NOTE
The configured register watch range is displayed in black text while the external watches are displayed in grey text.

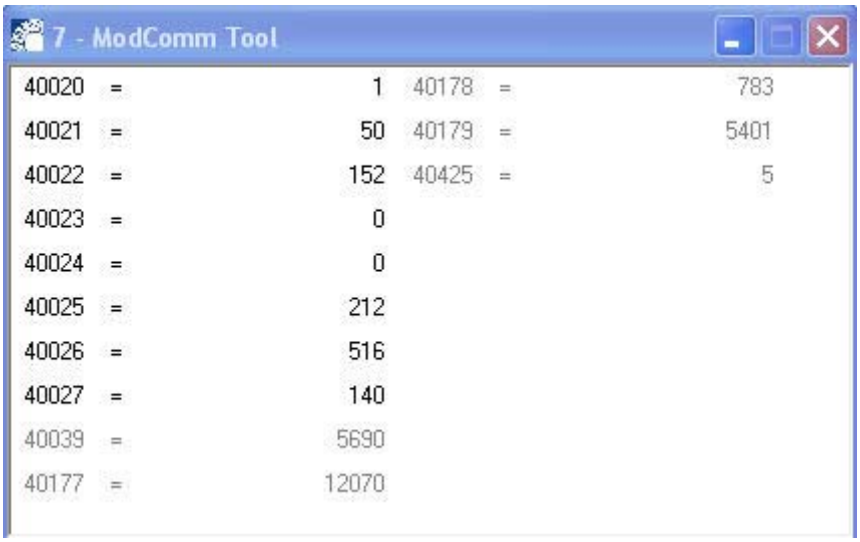


Figure 23 ModComm Tool Window Showing External Watches

3.5 Making a Single Write Request

To make a single write request:

1. Double-click on a register value, or right-click on a Modbus register in the main form and select **Write Single Value** from the context menu.

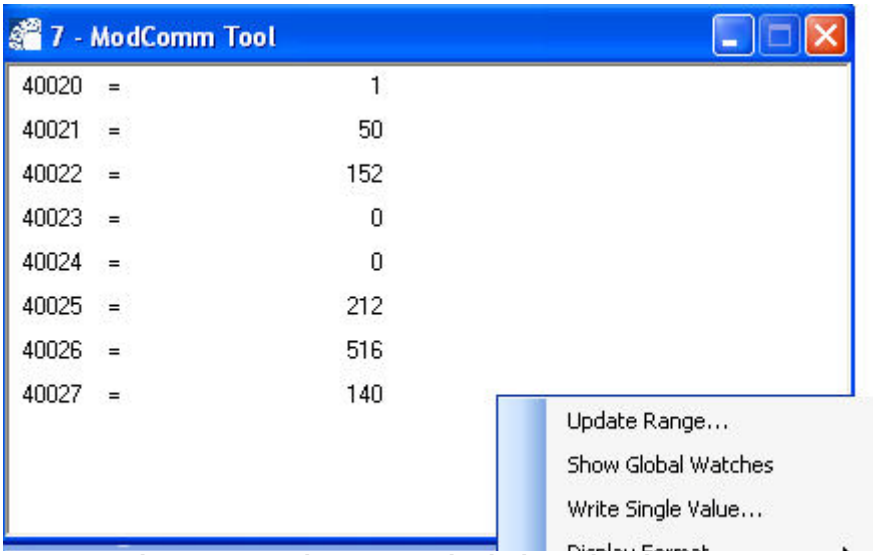


Figure 24 ModComm Tool Window Showing Menu

The *Write Single Register* window displays.

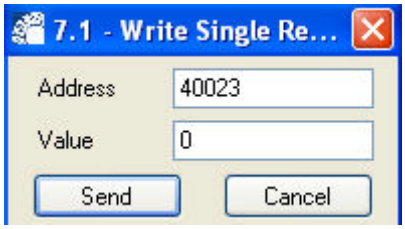


Figure 25 Write Single Register

2. Enter a **valid register address** (if necessary) and the **appropriate value.**

3. Click **Send** to perform the write. A window displays indicating the result of the operation.

Figure 26 Write Single Register Result Window

3.6 Changing the Current Data Interpretation View

To change the current data interpretation view:

1. Right-click **anywhere on the main form** and the context menu will display.

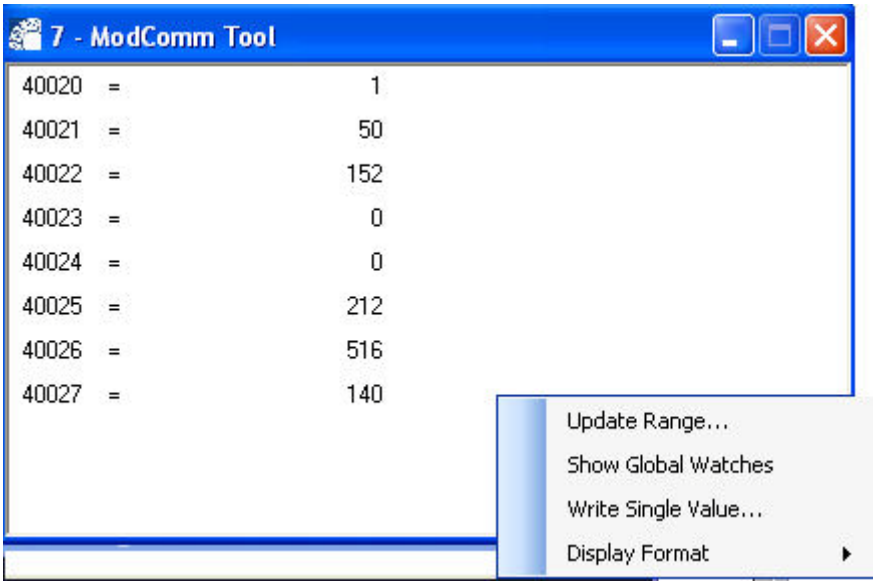


Figure 27 ModComm Tool Window Showing Menu

2. Highlight **Display Format**.

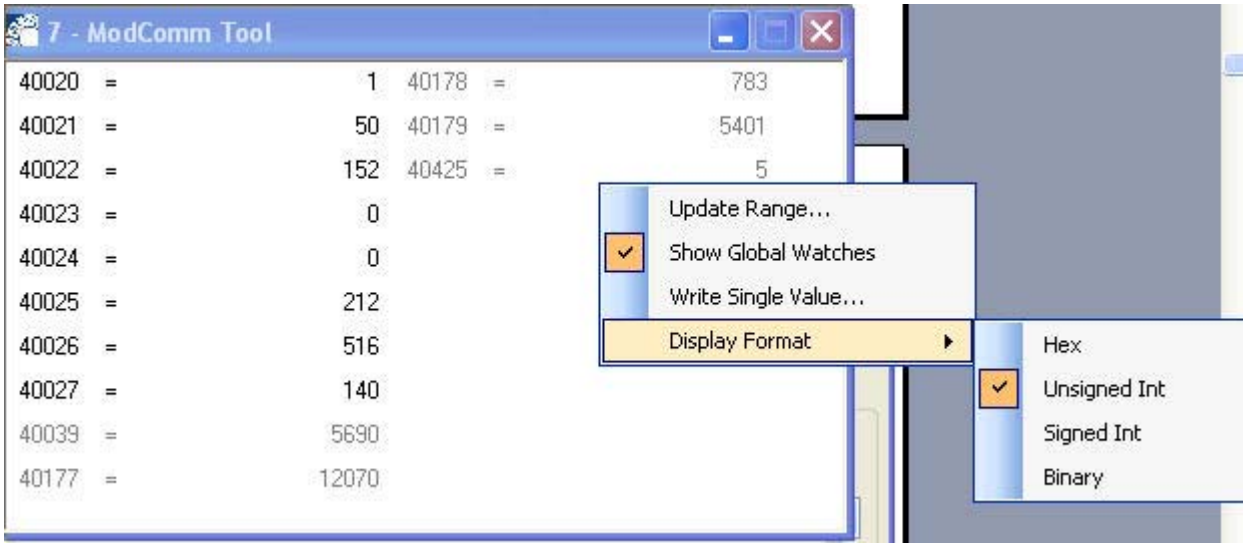


Figure 28 ModComm Tool Window Showing Display Format Options

3. Select the **desired value display format**. The values displayed in the main form will be formatted as specified.

4 Active Alarm/Fault Viewer

The *Active Alarm/Fault Viewer* allows you to instantaneously monitor the alarm and fault status of a connected compressor device and configure the alarm and fault limits. This tool can be used to view compressor alarms and faults, view motor alarms and faults, view bearing alarms and faults, and view/configure alarm and fault limits and lockout settings.

NOTE
This tool may not function properly if the connected compressor's access level is below Low.

NOTE
For alarm/fault indicators, alarm and fault status are indicated by the colored LED graphic to the left of the alarm/fault name (alarms are yellow, faults are red, and alarm + fault are orange)

4.1 Accessing the Active Alarm/Fault Viewer Tool

- Once connected, select the **Active Alarm/Fault Viewer tool icon** from the *SMT Suite Launcher Strip*.

Figure 29 Active Alarm/Fault Viewer Tool Icon

The *Active Alarm/Fault Viewer* window displays.

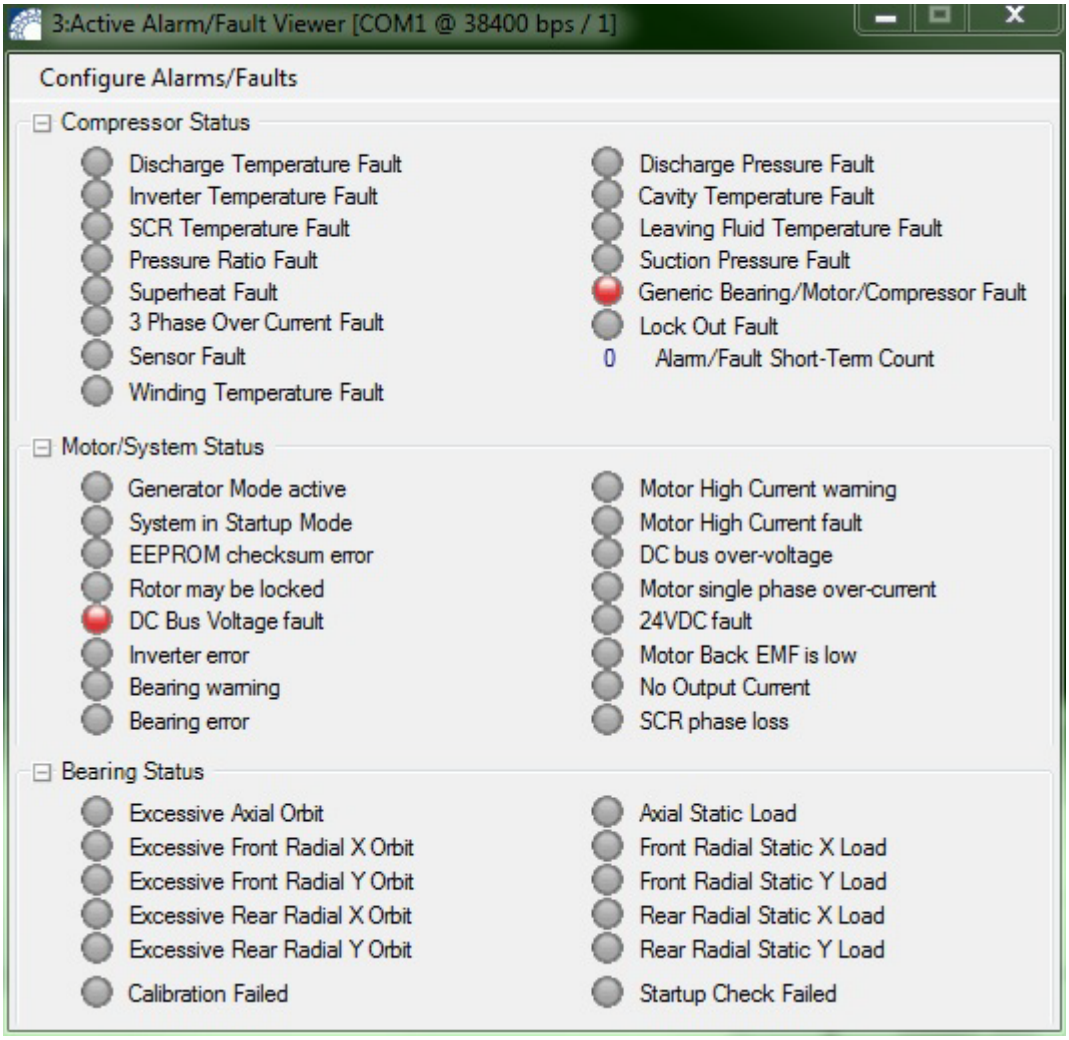


Figure 30 Active Alarm/Fault Viewer Window

4.2 Viewing and Configuring Alarm/Fault Limits and Lockout Settings

To view/configure alarm and fault limits and lockout settings:

- Click the **Configure Alarms/Faults** menu option. The *Alarm and Fault Settings* window displays.

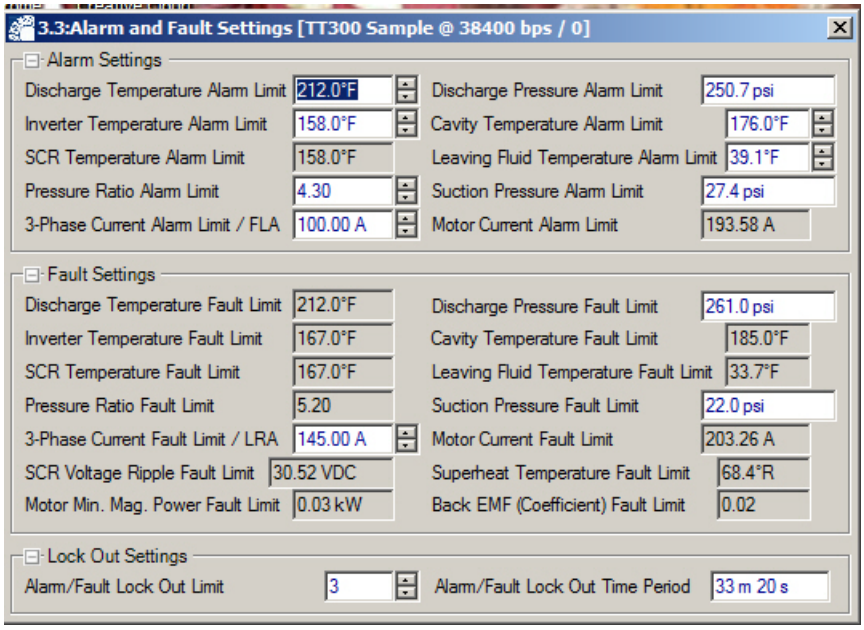

3.3:Alarm and Fault Settings [TT300 Sample @ 38400 bps / 0]
Alarm Settings
Discharge Temperature Alarm Limit 212.0°F
Discharge Pressure Alarm Limit 250.7 psi
Inverter Temperature Alarm Limit 158.0°F
Cavity Temperature Alarm Limit 176.0°F
SCR Temperature Alarm Limit 158.0°F
Leaving Fluid Temperature Alarm Limit 39.1°F
Pressure Ratio Alarm Limit 4.30
Suction Pressure Alarm Limit 27.4 psi
3-Phase Current Alarm Limit / FLA 100.00 A
Motor Current Alarm Limit 193.58 A
Fault Settings
Discharge Temperature Fault Limit 212.0°F
Discharge Pressure Fault Limit 261.0 psi
Inverter Temperature Fault Limit 167.0°F
Cavity Temperature Fault Limit 185.0°F
SCR Temperature Fault Limit 167.0°F
Leaving Fluid Temperature Fault Limit 33.7°F
Pressure Ratio Fault Limit 5.20
Suction Pressure Fault Limit 22.0 psi
3-Phase Current Fault Limit / LRA 145.00 A
Motor Current Fault Limit 203.26 A
SCR Voltage Ripple Fault Limit 30.52 VDC
Superheat Temperature Fault Limit 68.4°R
Motor Min. Mag. Power Fault Limit 0.03 kW
Back EMF (Coefficient) Fault Limit 0.02
Lock Out Settings
Alarm/Fault Lock Out Limit 3
Alarm/Fault Lock Out Time Period 33 m 20 s

Figure 31 Alarm and Fault Settings

5 Compressor Monitor

The *Compressor Monitor* tool allows you to monitor the most commonly desired parameters of the BMCC related to motor, bearing, and compressor operation. This tool can be used to view compressor, bearing, and motor operational readouts, change the demand, change the IGV opening, change the desired motor speed, and levitate/de-levitate the shaft.

5.1 Accessing the Compressor Monitor

- Once connected, select the **Compressor Monitor Tool icon** from the *SMT Suite Launcher Strip*.

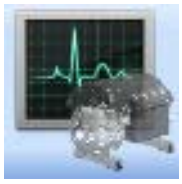


Figure 32 Compressor Monitor Tool Icon

The *Compressor Monitor* window displays.

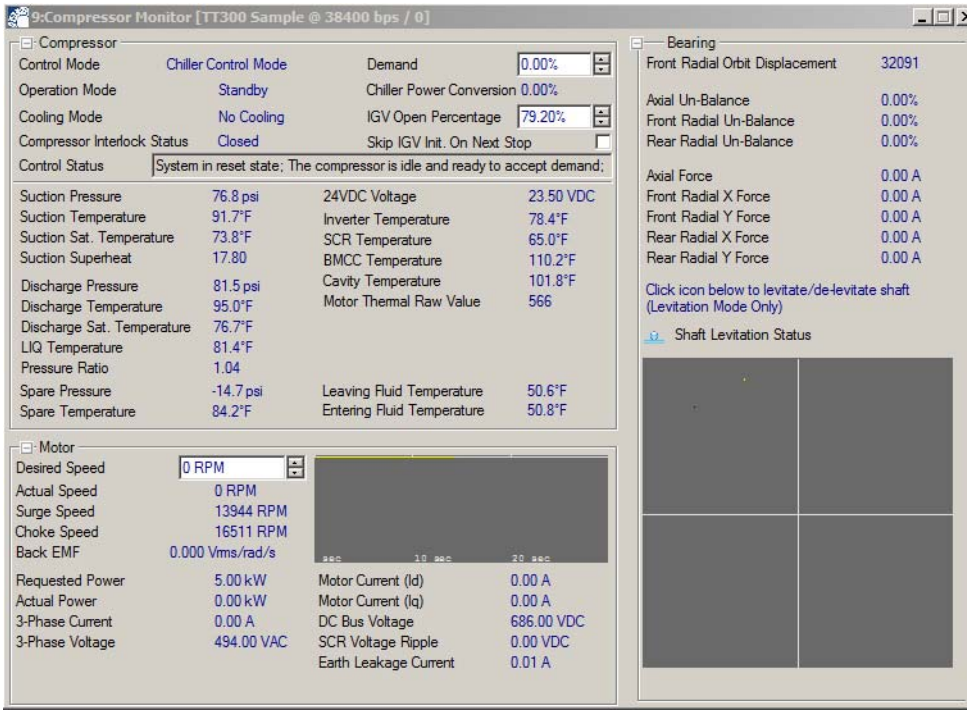


Figure 33 Compressor Monitor Tool Window

5.2 View Options

The following view options are available on the *Compressor Monitor Tool* window:

- To view bearing-related readouts, expand the *Bearing* section

  Included in this section is a graph which displays the front radial bearing (in blue) and rear radial bearing (in yellow) offset position.

- For compressor-related readouts, expand the *Compressor* section

NOTE
The Pressure Ratio value displayed CAN NOT be guaranteed to accurately reflect the pressure ratio as calculated by the BMC for BMCC software versions earlier than 1210 - in such a case, it is at best an approximation of what the compressor is assumed to be calculating.

- For motor-related readouts, expand the *Motor* section

  Included in this section is a graph which displays the motor current (Id) (in blue) and motor current (Iq) (in yellow) offset position.

5.3 Changing the Demand

To change the demand:

1. Expand the **Compressor** section.
2. In the *Demand* field, either **use the up/down arrows or manually enter a value** and press **Enter** to submit a new value.

5.4 Changing the IGV Opening

To change the IGV opening:

1. Make sure you are in Manual mode.
2. Expand the **Compressor** section.
3. In the *IGV Open Percentage* field, either **use the up/down arrows or manually enter a value** and press **Enter** to submit a new value.

5.5 Changing the Desired Motor Speed

To change the desired motor speed:

1. Make sure you are in Manual mode.
2. Expand the **Motor** section.
3. In the *Desired Speed* field, either use the **up/down arrows or manually enter a value** and press **Enter** to submit a new value

5.6 Levitating or De-levitating the Shaft

NOTE
This procedure will only work if you are in “Levitate Only” mode.

To levitate or de-levitate the shaft:

1. Expand the **Bearing** section.
2. Click the **Shaft Levitation Status** graphic located just above the *Bearing* graph.

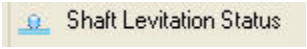


Figure 34 Shaft Levitation Status Graphic

The graphic will appear as a floating yellow ball when the shaft is levitating and a blue ball on the ground if the shaft is de-levitated.

6 Logged Event and Fault Viewer

The *Logged Event and Fault Viewer* allows you to retrieve logged fault and event data regarding the operation of a connected compressor for the purpose of troubleshooting and diagnostics.

This tool can be used to retrieve logged event/fault data, watch for new logged event/fault data, view details pertaining to logged events/faults, export logged event/fault data to file, import logged event/fault data from file, view the fault occurrence counters, view runtime history data, and view application help information.

NOTE
This tool may not function properly if the connected compressor's access level is below Low

6.1 Accessing the Logged Event and Fault Viewer

NOTE
Launch this tool after connecting to a compressor. Any instance of this tool launched before connecting to a compressor will remain “offline”. Launch another instance of this tool after connecting if you later want to view logs of a connected device.

1. Click the **Logged Event and Fault Viewer** icon.

Figure 35 Logged Event and Fault Viewer Icon

The *Logged Event and Fault Viewer* window displays:

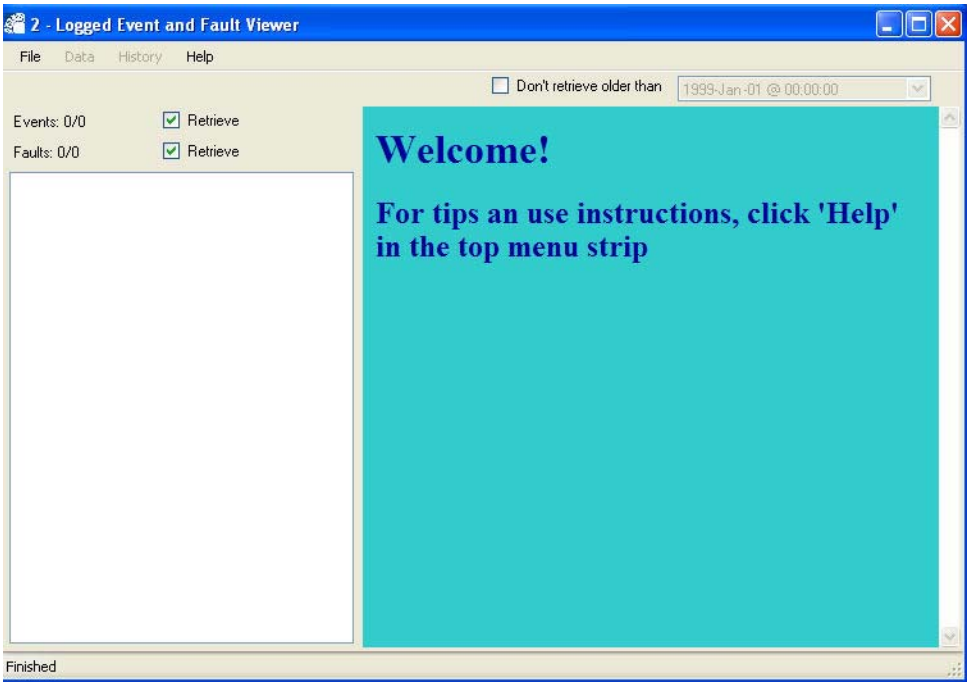


Figure 36 Logged Event and Fault Viewer Window

6.2 Applying Filters for Data Retrieval and Watching

To apply filters for data retrieval and watching:

- To retrieve logged event data from the connected compressor, check the **Retrieve** check box to the side of the *Events* count indicator.
- To retrieve logged fault data from the connected compressor, check the **Retrieve** check box to the side of the *Faults* count indicator.
- To apply a cut-off date/time for items retrieved, select the **Don’t retrieve older than** check box, and then choose a date from the calendar drop-down. Items older than the selected date will not be retrieved.

6.3 Retrieving Logged Event and Fault Data

NOTE
Closing the Logged Event & Fault Viewer will terminate the retrieve functions.

To retrieve logged even and fault data:

1. Click the **Data->Start Retrieving** menu item.

   The tool will automatically start retrieving events and faults as specified until either there are no more entries to retrieve or there are no more entries within the specified date/time range filter. Entries will appear in the event/fault listing panel.

2. To stop retrieving logged event and fault data before retrieval is completed, click **Data->Stop Retrieving Data**.

6.4 Watching for New Logged Event and Fault Data

NOTE
Closing the Logged Event & Fault Viewer will terminate the watch functions.

To watch for new logged event/fault data:

1. Click **Data->Watch for New…** menu item.

   The tool will continuously check for changes in the event and fault logs as specified. Entries will display in the *Event/Fault Listing* pane.

2. To stop watching for new logged event and fault data, click the **Data'->'Stop Watching** menu item.

6.5 Viewing Logged Events and Faults Details

To view details pertaining to logged events and faults:

- Click on any entry in the *Event/Fault Listing* panel.

  The tool will display details and analysis information describing the selected event or fault

6.6 Exporting Logged Event and Fault Data to a File

To export logged event/fault data to file:

1. Do one of the following:

   a. To export only selected entries, **select desired entries** in the event/fault listing panel, and then select **File->Export Selected**.

   b. To export all entries, select **File->Export all**.

2. In the *Save as* window, select an **output file name and data type**. For a reusable format which may be reopened at a later time, select *TLF files* from the file type drop down. For CSV output, select *CSV files* from the file type drop down.

6.7 Importing Logged Event and Fault Data

NOTE
You do not have to be connected to a compressor to import a saved TLF file for viewing.

To import logged event/fault data from a file:

- Click **File>Import Data**.
- In the *Open file* window, select **a previously exported TLF logged event/fault data file**.

  If the file is valid, event and fault entries will display in the *Event/Fault Listing* panel.

6.8 Viewing the Fault Occurrence Counters

To view the fault occurrence counters:

- Click the **History->View Fault Occurrence History** menu option.

  The tool will display a form listing the fault occurrence counters.

6.9 Viewing Runtime History Data

To view rutime history data:

- Click the **History->View Runtime History** menu option.

  The tool will display a form containing various runtime history data.

6.10 Viewing Application Help Information

To view application help information:

- Click the Help menu option, and then select any help area item from the list which appears.

  The tool will display relevant help information in the details view

7 Compressor Data Recording and Playback Tool

The *Compressor Data Recording & Playback* tool is used to start and stop recording of any variables on the BMCC, as well as to launch a server partially simulating an actual compressor using previously recorded data. The intended usage of this tool is not only for training, but for testing, evaluation, and compressor troubleshooting purposes. This tool can be used to either record data communicated between the desktop SMT system and a compressor or to host ('playback') recorded data for use with the SMT system.

When recording, the tool can be used to create a new recording, start recording, end recording, cancel recording, and pause/resume recording. A recording can be created and started either before or after establishing a connection with a compressor.

When playing back, the tool can be used to open a recording, close an open recording, manually launch a playback server, stop a playback server, manipulate the playback rate, seek playback time, and specify the minimum access level.

7.1 Launching the Compressor Data Recording and Playback Tool

To launch the *Compressor Data Recording and Playback Tool*:

- Click the **Compressor Data Recording and Playback Tool** icon.

Figure 37 Compressor Data Recording and Playback Tool Icon

7.2 Recording

7.2.1 Creating a Recording

To create a new recording:

1. Click the **New Recording** icon.

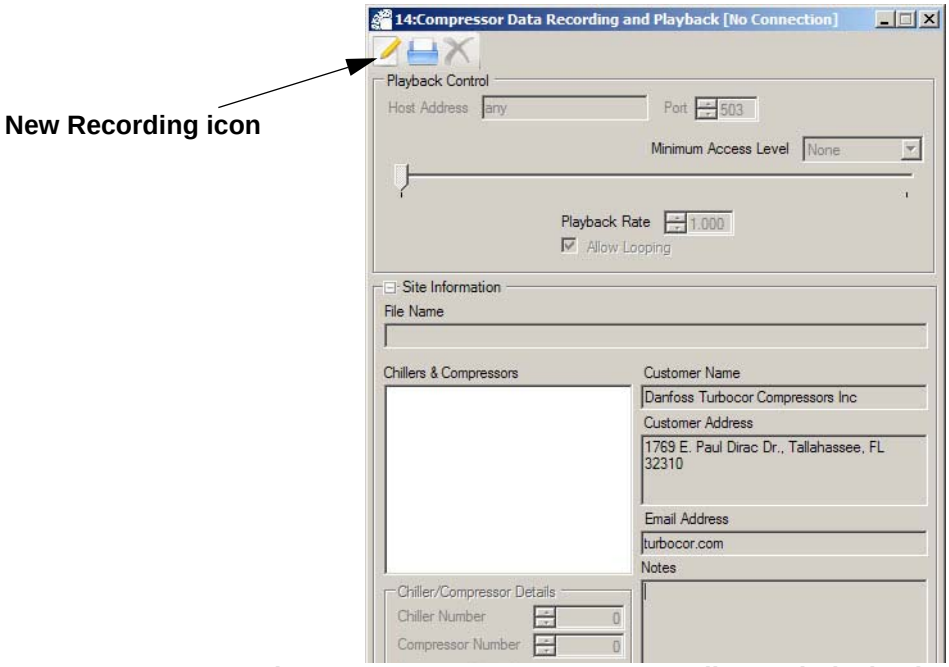


Figure 38 Compressor Data Recording and Playback

2. A *Save as* window displays. Select an **output filename** and click **OK**.

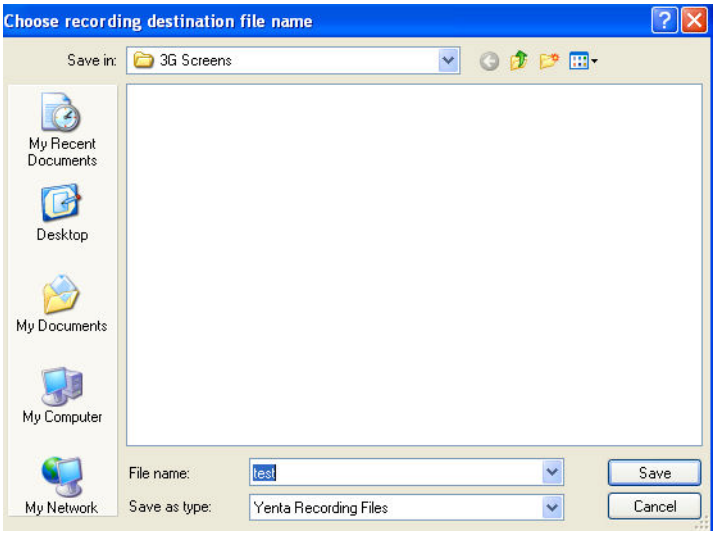


Figure 39 Choose Destination File Name

3. In the *Site Information* section, enter the **Customer Name**, **Customer Address**, **Email Address**, and any **Notes** regarding the recording (optional).

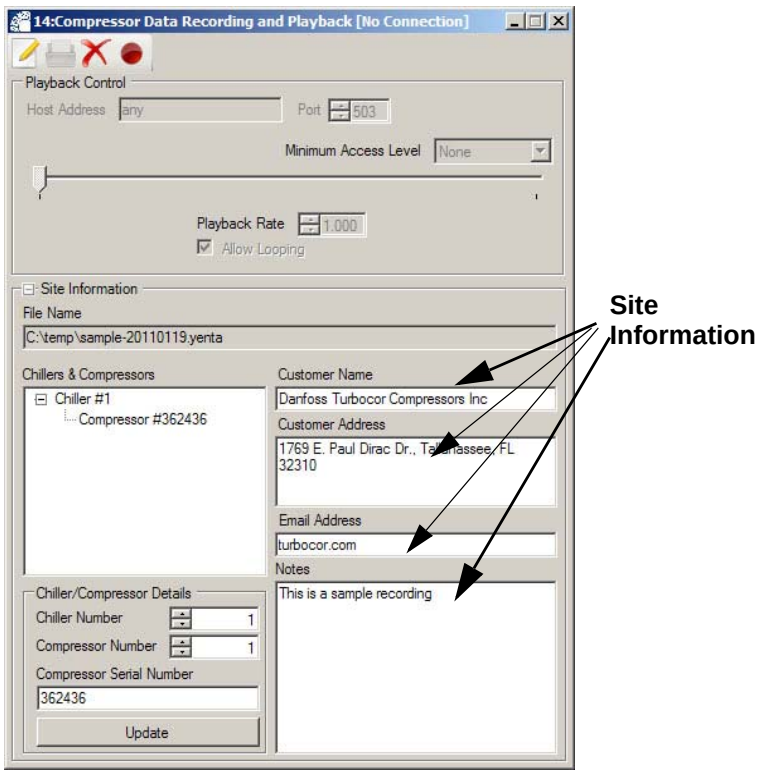


Figure 40 Site Information

4. To change the chiller and compressor identification, in the *Chillers & Compressors'* tree, select the **compressor node** and change the **chiller number, compressor number, and compressor serial number,** and then click **Update.**

5. To start recording, click the **Start Recording** (record circle) menu item.

Figure 41 Start Recording Icon

The tool will automatically make an initial read of all standard compressor parameters and begin polling all 'volatile' compressor parameters until recording is finished.

NOTE
Recording can be started **before** or after establishing a connection with a compressor

The tool will automatically save and close the recording when an active compressor connection is closed.

NOTE
The *current time* indicator may appear to only advance in short bursts - this is normal and is not indicative of performance degradation

7.2.2 Ending a Recording

To end a recording:

1. Click the **Stop Recording** menu item

Figure 42 Stop Icon

The tool will prompt you to verify ending of recording.

2. Click **Yes** to stop recording.

The tool will stop recording, finish writing any buffered data reads, compress, and close the recording. Long recordings may take a moment to save - file saving progress is displayed at the bottom of the *Playback Control* section.

NOTE
If no data has been recorded, a file will not be created

NOTE
If compressor connection is lost during recording, the recording file will automatically save and close

7.2.3 Cancelling a Recording

To cancel a recording:

1. Click the **Cancel Recording** (red X) menu item

Figure 43 Cancel Recording Icon

You are prompted to verify canceling of the recording.

2. Click **Yes** to cancel.

The tool will cancel recording, wait for any pending writes to complete, close the file, and delete the temporary recording data

7.2.4 Pausing a Recording

To pause a recording:

- If recording is active, click the **Pause Recording** (red pause marks) menu item - the tool will suspend recording data until recording is stopped or resumed.

Figure 44 Pause Recording Icon

7.2.5 Resuming a Recording

To resume a recording:

- If recording is paused, click the **Start Recording** menu item - the tool will resume recording data.

Figure 45 Start Recording Icon

7.3 Playback

7.3.1 Playing Back a Recording

1. To open a recording, click the **Open Recording** (folder) menu item.

Figure 46 Open Recording Icon

An *Open file* window displays.

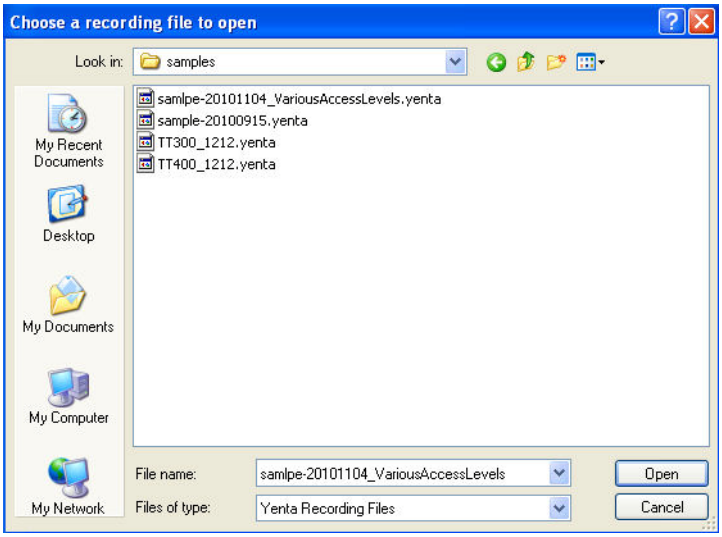


Figure 47 Choose a Recording to Open Window

2. Select a **recording file**.

   If the file is properly loaded, the recording's site information displays in the 'Site Information' section - this data may not be altered.

3. The playback server will automatically attempt to launch - if there are any problems starting the playback host, a popup dialog displays.

NOTE
A connection with the playback server may be made in the same manner as with a remote compressor - Match the client host name and TCP port settings with those displayed in this application.

NOTE
Typically, the default settings - host address = any and port = 503 - are acceptable; however, ensure that this port is unused. For example, another application may be using port 503. The 'launch' button will not display if the host name text box is empty.

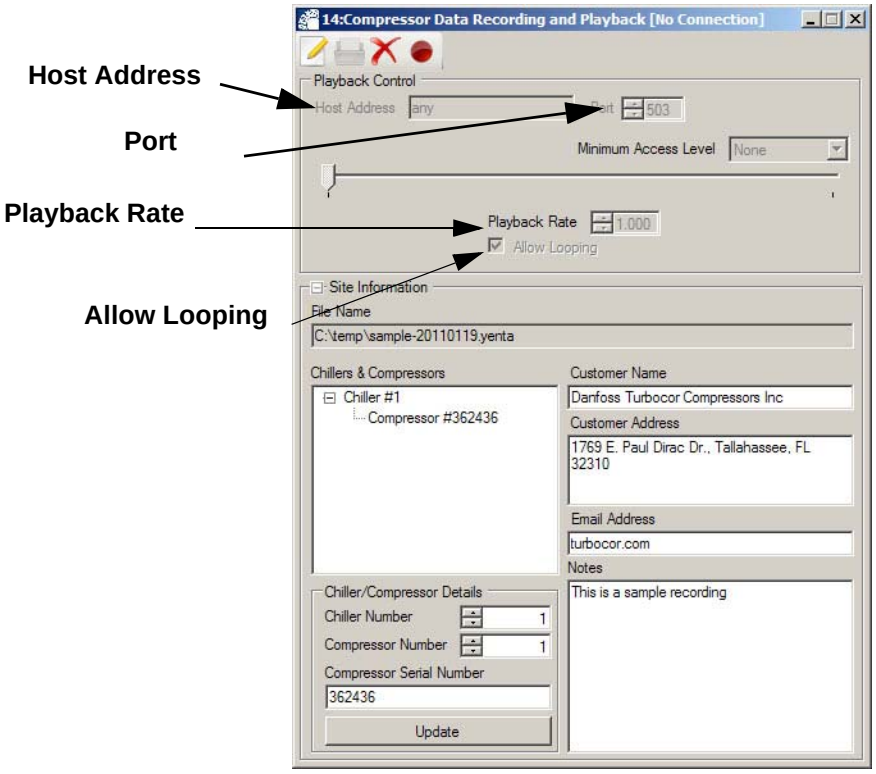


Figure 48 Compressor Data Recording and Playback Window

When the first connection is established, the playback rate will automatically be changed to 1 (play). Likewise, when the last client disconnects, playback will automatically pause. Long recordings may take a moment to completely load - file load progress is displayed at the bottom of of the Playback Control section. If data is currently not ready for a desired recording time, the playback time will reset - this is normal and, in this case, please wait until the appropriate data range has been loaded.

7.3.2 Enabling or Disabling Automatic Playback Looping

The tool contains an *Allow Looping* feature which will enable the playback server to loop the playback timer when a boundary time is reached; otherwise the playback will pause.

- To enable looping, click the **Allow Looping** checkbox; to disable looping un-check the checkbox.

7.3.3 Closing an Open Recording

To close an open recording:

1. Click the **Close Recording** menu item.

Figure 49 Close Recording Icon

The tool will prompt to confirm the closure of the recording file.

2. Select **Yes** to close the file and terminate any active playback sessions.

7.3.4 Manually Launching a Playback Server

To manually launch a playback server:

1. in the *Playback Control* section, enter the **desired playback server host name/address and TCP port**.

NOTE
In most cases, the default settings, host name= “any” and port=“503” are acceptable entries; however ensure that port 503 is unused. It may be used by another application. The launch button will not appear if the host text box is empty.

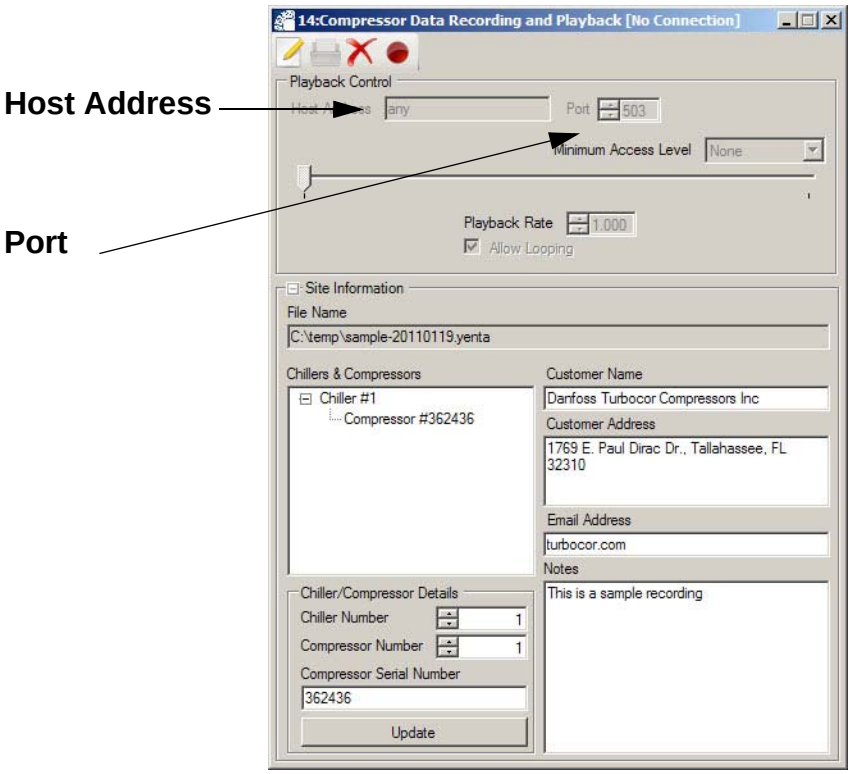


Figure 50 Playback Window

2. Click the **Launch Playback Server** menu item.

Figure 51 Launch Playback Server

NOTE
If the server fails to start, the tool will display a notification

The data will be hosted as if connected to an actual compressor.

3. Initiate a **remote connection** using the same configuration used to launch the playback server and select the **port** which reflects the serial number of the source compressor.

NOTE
The playback server will launch in the paused mode - click the play button (play triangle) to begin playback at a normal rate.

7.3.5 Stopping the Playback Server

To stop the playback server:

1. Click the **Stop Playback Server** menu item.

Figure 52 Stop Playback Server

You are prompted for confirmation of termination of the playback server:

2. Select **Yes** to terminate the playback server.

7.3.6 Changing the Playback Rate

To change the playback rate:

In the *Playback Control* section, the playback rate may be manually specified by either using the up/down arrows or by entering a number in the *Playback Rate* field.

- To play at the normal rate (1.0), click the **Play** menu item .

Figure 53 Play Menu Item

- To pause the playback rate (rate = 0.0), click the **Pause** menu item.

Figure 54 Pause Menu Item

- If the absolute value of the playback rate >= 1.0, click the **Fast Forward** menu item to double playback rate up to 8x.

Figure 55 Fast Forward Menu Item

- If the absolute value of the playback rate >= 1.0, click the **Reverse** menu item to double playback rate up to -8x.

Figure 56 Reverse Menu Item

- If the absolute value of the playback rate < 1.0, click the **Slow Forward** menu item to increase playback rate up to 1x in 1/8 increments.

Figure 57 Slow Forward Menu Item

- If the absolute value of the playback rate < 1.0, click the **Slow Reverse** menu item to decrease playback rate down to -1x, in 1/8 increments.

Figure 58 Slow Reverse Menu Item

7.3.7 Seeking Playback Time

To seek playback time:

- Click the **Rewind** menu item to seek back to the beginning of the playback data.

Figure 59 Rewind Menu Item

- To set the playback time, in the *Playback Control* section, click and drag the **track bar along the time line**.

7.3.8 Specifying the Minimum Access level

In case the recorded access level is too low to use certain tools for viewing, you can specify the minimum access level:

To specify the minimum access level:

- From the *Minimum Access Level* drop-down, select the desired minimum access level.This forces the playback server to disallow the access level to drop below the level specified.

NOTE
You have to enter your Access level on the *Compressor Connection Manager* window to see the appropriate level. See **"Changing Compressor Access Levels" on page 33.**

8 Bearing Calibration Tool

The *Bearing Calibration Tool* allows you to execute a bearing calibration procedure and analyze the outcome. The tool can be used to calibrate the bearings, validate a calibration, view the current persistent and latest calibration values and create a calibration report.

NOTE
This tool may not function properly if the connected compressor's access level is below 3-Technician. This tool requires exclusive application focus - all other tools will be closed or hidden when starting this tool.

8.1 Accessing the Bearing Calibration Tool

- Once connected, select the **Bearing Calibration tool icon** from the *SMT Suite Launcher Strip*.

Figure 60 Bearing Calibration Tool Icon

The *Bearing Calibration* window displays:

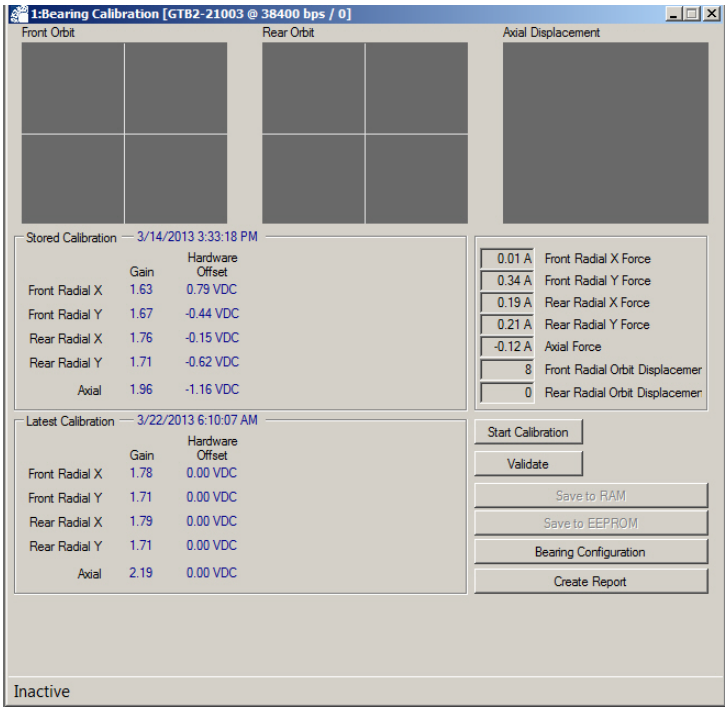


Figure 61 Bearing Calibration Window

NOTE
If the *Save to EEPROM* setting is set to *RAM Only* on the *Compressor Connection* window, the *Save to EEPROM* button will be unavailable for use on the *Bearing Calibration* window.

8.2 Performing a Calibration

To perform a calibration:

1. Ensure that the compressor's interlock is open and the Modbus connection to the compressor is disconnected.

2. Click the **Start Calibration** button.

   The tool will invoke the calibration sequence on the compressor and display the bearing offset data in the three graphs visible at the top of the main form

   The left-most graph displays data pertinent to the front radial bearing; the middle graph displays data pertinent to the rear radial bearing; and the right-most graph displays data pertinent to the axial bearing The radial graphs display the offsets of the shafts edges. The axial graph displays the axial displacement by time.

   After the compressor successfully completes a bearing calibration sequence, the option to **Save to RAM** or **Save to EEPROM** become available.

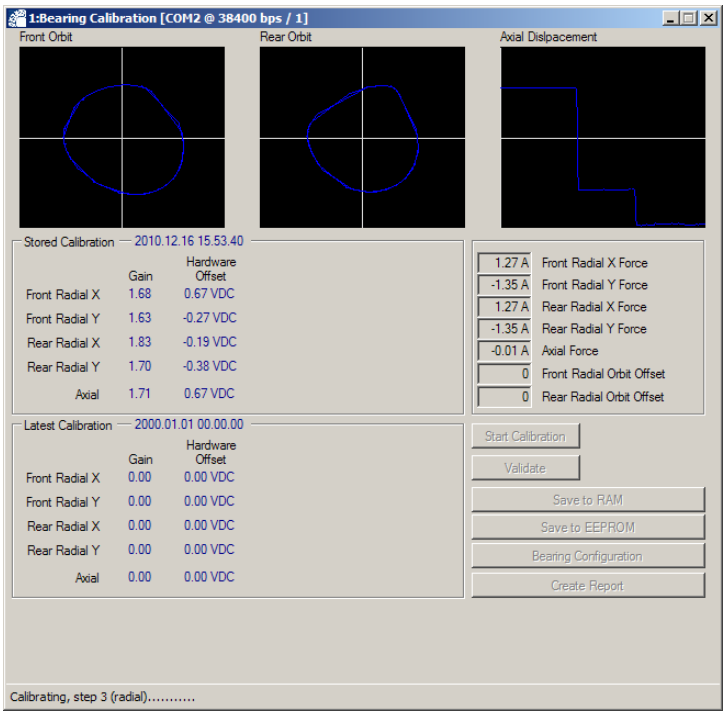


Figure 62 Bearing Calibration Tool Showing Graphs

8.3 Performing a Validation

To perform a validation:

- Click the **Validate** button.

  The tool will validate the calibration by levitating the shaft, sampling orbit offset data, and performing validation using these data as well as the calibration values.

NOTE
If the tool indicates that it is unable to perform a validation, check for any faults present and take appropriate actions before attempting validation again.

8.4 Saving the Latest Bearing Calibration for Temporary Use

This calibration will be lost the next time the compressor power is cycled. The compressor will revert back to previous calibration information saved in EEPROM.

8.5 Saving the Latest Bearing Calibration for Persistent Use

- To save the latest bearing calibration for persistent use, click the **Save to EEPROM** button. The tool will notify the compressor to use the latest calibration for persistent operation.

  This calibration will overwrite previous calibration data.

NOTE
If the last calibration values differ from the stored values outside of the tolerances set in the SMT, a warning message will appear when saving to the EEPROM. This measures changes from the stored calibration and may be an indicator of shaft alignment changes over time. Refer to the **Service Manual** for further information.

8.6 Viewing Bearing Calibration or Operation Settings

To view bearing calibration or operation settings:

1. Click the **Bearing Configuration** button.

   The tool will display a form consisting of three sections*: Calibration Limits*, *Operational Limits*, and *Bias Settings.*

2. Close the form when done.

8.7 Creating a Calibration Report

To create a calibration report:

1. Click the **Create Report** button.

   A *Save As* window displays.

2. Select a **path** to use for saving the generated report.

   The tool will generate a report at the user-specified path.

9 Chiller and Analog Configuration Tool

The *Chiller and Analog Configuration* tool allows you to view and configure the configuration and operational parameters of the BMCC's chiller controller and analog output controller. This can be used to view or modify the chiller control and analog output control configuration settings.

The tool can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

9.1 Accessing the Chiller and Analog Configuration Tool

- Once connected, select the **Chiller and Analog Configuration Tool** icon from the *SMT Suite Launcher Strip*.

Figure 63 Chiller and Analog Configuration Tool Icon

The *Chiller and Analog Configuration* window displays:

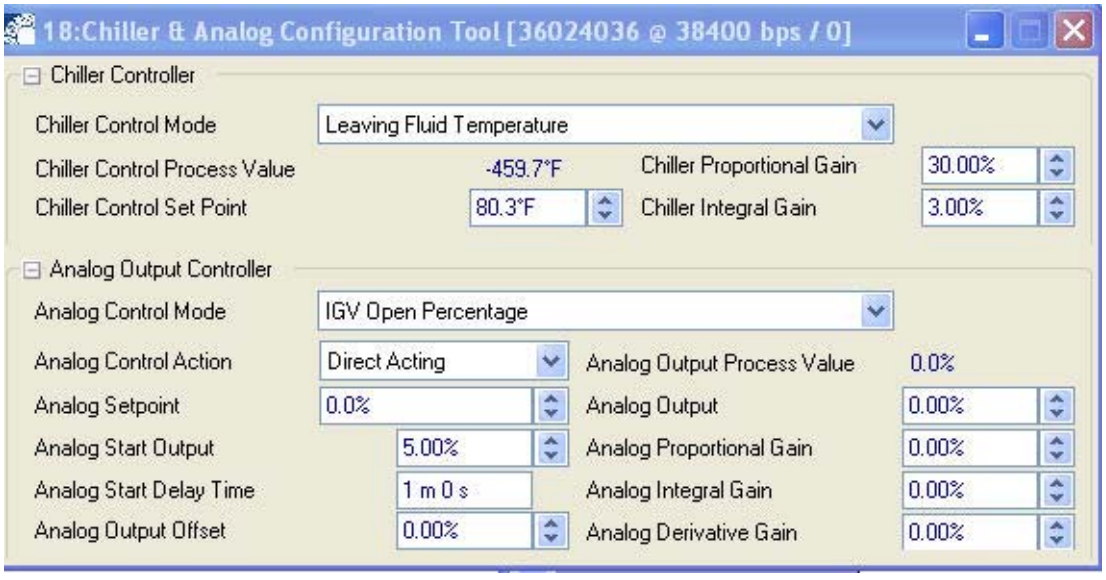


Figure 64 Chiller and Analog Configuration Window

9.2 Viewing or Modifying Chiller Controller Settings

To view or modify the chiller controller settings:

1. Expand the **Chiller Controller** section

   This section includes:

   - Chiller Control Mode - The functional control mode of the compressor and how it is expected to interact with external chiller system components.
   - Chiller Set Point - Represents the operational target for the chiller control loop.
   - Chiller Proportional Gain - Represents the proportional gain for the chiller control loop. The higher the proportional gain, the more severe the reaction to a given instantaneous deviation from the setpoint will be.
   - Chiller Integral Gain - Represents the integral gain for the chiller control loop. The higher the integral gain, the more severe the reaction to an accumulated deviation from the setpoint over time will be.

2. Modify as necessary.

9.3 Viewing or Modifying Analog Output Controller Settings

To view or modify the analog output settings:

1. Expand the **Analog Output Controller** section.

   This section includes:

   - Analog Control Mode - Represents the methodology used to control the Analog Output.
   - Analog Control Action - Indicates the control action of the analog output.
   - Analog Setpoint - The target value by which the analog output controller operates.
   - Analog Start Output - This value represents the percentage of maximum voltage sent to the 'ANALOG' (JP1) terminal on the compressor interface module. This position will be maintained until the Start Delay Timer has expired.
   - Analog Start Delay Time - Represents the time in seconds that the analog Start Output is held. The Start Delay Timer starts to count down when drive is enabled.
   - Analog Output Offset - Represents the minimum amount of the maximum output voltage to output at all times.
   - Analog Output Process Value - The process value used by the BMCC for analog output control. *This readout is only available for BMCC software versions 1210 or later.*
   - Analog Output - The value indicated by the analog output via the analog output controller.
   - Analog Proportional Gain - Represents the analog output proportional gain.
   - Analog Integral Gain - Represents the analog output integral gain.
   - Analog Derivative Gain.- Represents the analog output derivative gain.

2. Modify as necessary.

10 EXV Configuration Tool

The *EXV Configuration Tool a*llows you to view and configure the electronic expansion valve configuration parameters and settings.

The tool can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

10.1 Accessing the EXV Configuration Tool

- Once connected, select the **EXV Configuration Tool icon** from the *SMT Suite Launcher Strip*.

Figure 65 EXV Configuration Tool Icon

The *EXV Configuration Tool* displays.

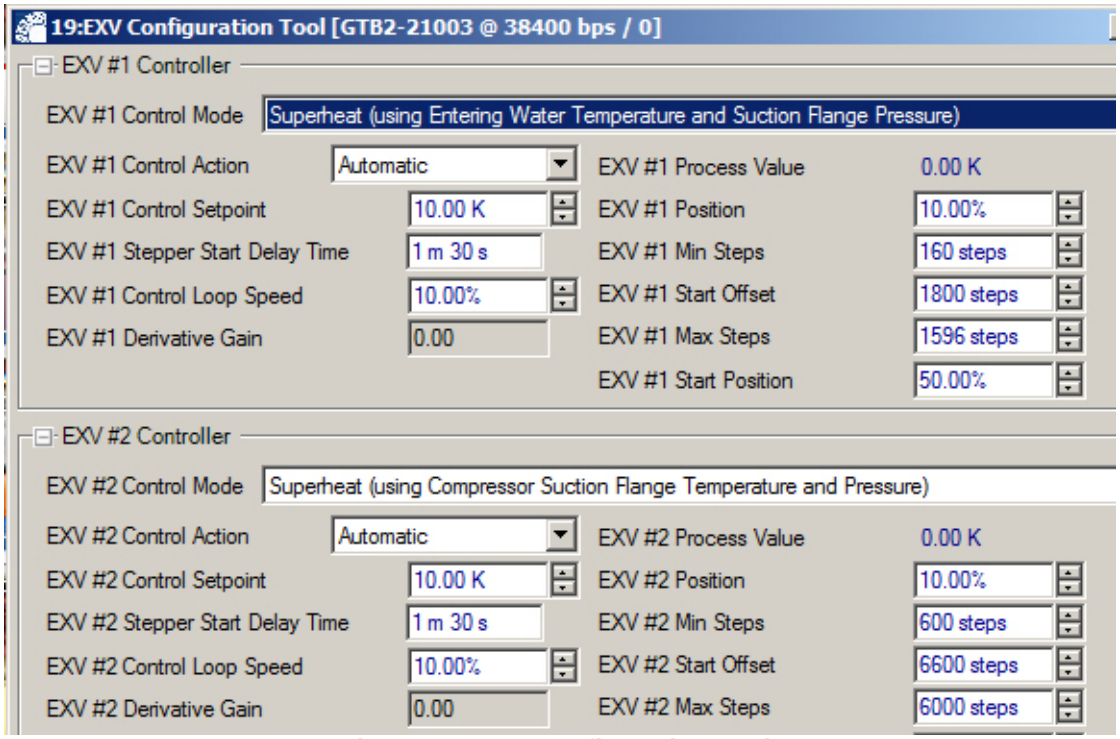


Figure 66 EXV Configuration Tool

10.2 Viewing and Modifying EXV Controller Settings

To view or modify external expansion valve settings:

- Expand either the 'EXV #1 Controller' or 'EXV #2 Controller' sections.

  These sections include:

  - EXV #1 Control Mode - The methodology used to control the EXV #1 output.
  - EXV #1 Control Action - Indicates the control action of the EXV output
  - EXV #1 Control Setpoint - Suction Superheat or Liquid Level percentage in accordance with the selected control mode. Not applicable to Load Balance control mode because the compressor will calculate the best position.
  - EXV # 1 Stepper Start Delay Time - Represents the time in seconds that the valve's Start Position is held. The Stepper Start Delay Timer starts to count down when drive is enabled.
  - EXV #1 Control Loop Speed - Represents the reaction time of the control loop to a process error and replaces the PID (proportional, integral, and derivative) controller gains.
  - EXV #1 Derivative Gain - The gain of the EXV controller's derivative component.
  - EXV #1 Process Value - The EXV's process value by which the EXV position is controlled.
  - EXV #1 Position - The current valve position.
  - EXV #1 Min Steps - The minimum number of steps EXV #1 can open.
  - EXV #1 Start Offset - The number of steps required to close EXV #1 to ensure initialization to the closed position.
  - EXV #1 Max Steps - The number of steps between the minimum and maximum positions for EXV #1.
  - EXV #1 Start Position - The percentage that the valve is open in start position

  and

  - EXV #2 Control Mode - The methodology used to control the EXV #2 output.
  - EXV #2 Control Action - Indicates the control action of the EXV output

- EXV #2 Control Setpoint - Suction Superheat or Liquid Level percentage in accordance with the selected control mode. Not applicable to Load Balance control mode because the compressor will calculate the best position.
- EXV # 2 Stepper Start Delay Time - Represents the time in seconds that the valve's Start Position is in held. The Stepper Start Delay Timer starts to count down when drive is enabled.
- EXV #2 Control Loop Speed - Represents the reaction time of the control loop to a process error and replaces the PID (proportional, integral, and derivative) controller gains.
- EXV #2 Derivative Gain - The gain of the EXV controller's derivative component.
- EXV #2 Process Value - The EXV's process value by which the EXV position is controlled.
- EXV #2 Position - The current valve position.
- EXV #2 Min Steps - The minimum number of steps EXV #2 can open.
- EXV #2 Start Offset - The number of steps required to close EXV #2 to ensure initialization to the closed position.
- EXV #2 Max Steps. - The number of steps between the minimum and maximum positions for EXV #2.
- EXV #2 Start Position - The percentage that the valve is open in start position.

11 BMCC System Configuration Tool

The *BMCC System Configuration Tool* allows you to view and change many of the system settings of a BMCC which are not included within the scope of compressor, chiller, motor, bearing, and etc. operation. This tool can be used to view or modify compressor identification settings, communication settings, or power configuration.

NOTE
The BMCC System Configuration Tool can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

11.1 Accessing the BMCC System Configuration Tool

- Once connected, select the **BMCC System Configuration icon** from the *SMT Suite Launcher Strip*.

Figure 67 BMCC System Configuration Tool Icon

The *BMCC System Configuration* window displays:

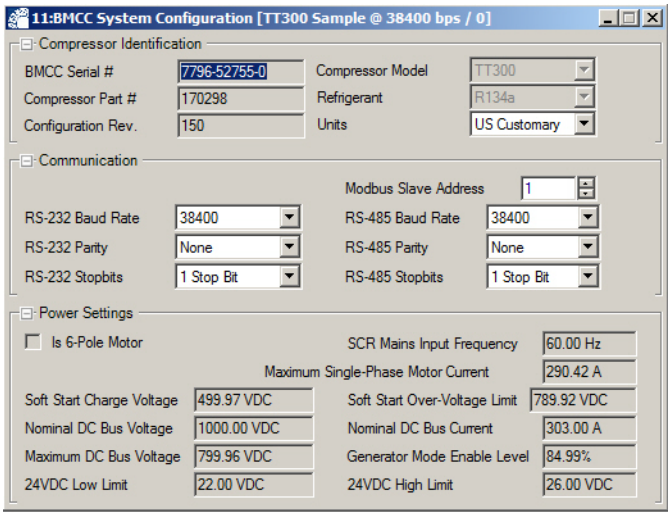


Figure 68 BMCC System Configuration Tool Window

11.2 Viewing Compressor Identification Settings

To view compressor identification settings:

1. Expand the **Compressor Identification** section.

   This section includes: BMCC Serial #, Housing Serial # (if applicable), Compressor Part #, Configuration Version #, Compressor Model, Refrigerant Type, and Unit System.

11.3 Viewing or Modifying Communication Settings

To view communication settings:

1. Expand the **Communication** section.

   This section includes: Modbus Slave Address, RS-485 Baud Rate, Parity, and Stop bits and RS-232 Baud Rate, Parity, Stop bits, and Handshake (if applicable).

2. Modify as necessary.

11.4 Viewing Power Settings

To view power settings:

1. Expand the **Power Setting** section.

   This section includes: SCR Mains Input Frequency, Max. Motor Current, Soft Start Over-Voltage Limit, Nominal DC Bus Current, Generator mode Enable Threshold, 24VDC High Limit, 24VDC Low Limit, Max. DC Bus Voltage, Nominal DC Bus Voltage, Soft Start Charge Voltage, and 6-Pole Motor Configuration.

12 Compressor Configuration Tool

The *Compressor Configuration Tool* allows you to view and configure the compressor operation, IGV, startup, surge/choke, and other operational configuration parameters and settings.

NOTE
The *Compressor Configuration Tool* can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

12.1 Accessing the Compressor Configuration Tool

- Once connected, select the **Compressor Configuration Tool** icon from the *SMT Suite Launcher Strip.*

Figure 69 Compressor Configuration Tool Icon

The *Compressor Configuration* window displays:

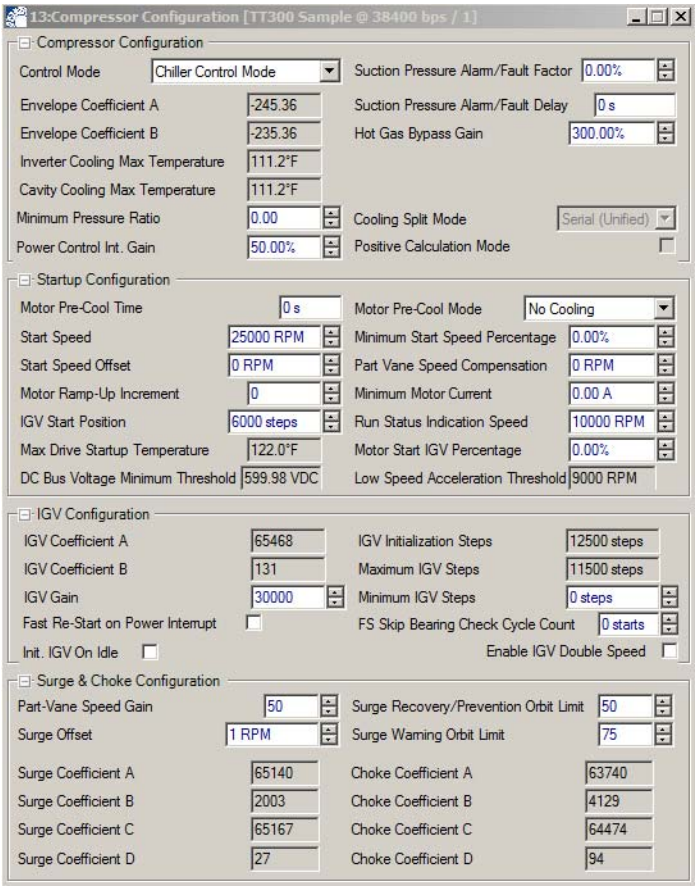


Figure 70 Compressor Configuration Window

12.2 Viewing or Modifying Compressor Operation Settings

To view or modify the compressor operation settings:

1. Expand the **Compressor Configuration** section.

   This section includes: Control Mode, Envelope Coefficients A & B, Suction Pressure Alarm/Fault Factor & Delay, Inverter & Cavity Cooling Max Temperatures, Hot Gas Bypass Gain, Cooling Mode, Power Control Loop Gain, Minimum Pressure Ratio, and Calculation Polarity.

2. Modify as necessary.

12.3 Viewing or Modifying Compressor Startup Settings

To view or modify the compressor startup settings:

1. Expand the **Startup Configuration** section.

   This section includes: Motor Pre-Cooling Mode and Time, Start Speed, Start Speed Offset, Motor Start Acceleration, Motor Start IGV Percentage, Max Drive Startup Temperature, Min. Start Speed Percentage, Part Vane Speed Compensation, Min. Motor Current, Run Status Contact Close Speed, IGV Start Position, Low Speed Acceleration Threshold, and DC Bus Voltage Min. Threshold.

2. Modify as necessary.

12.4 Viewing or Modifying IGV Configuration Settings

To view or modify the IGV configuration settings:

1. Expand the **IGV Configuration** section.

   This section includes: IGV Coefficient A & B, IGV Gain, IGV Init. Steps, Max & Min IGV Steps, Fast Re-Start on Power Interrupt, Fast Start Skip Bearing Check Cycle Count, and Initialize IGV on Idle.

2. Modify as necessary.

NOTE
Refer to *M-PR-001-EN OEM Programming Guide* for detailed information on the Fast Restart feature.

12.5 Viewing or Modifying Surge/Choke Configuration Settings

To view or modify the surge/choke configuration settings:

1. Expand the **Surge & Choke Configuration** section.

   This section includes: Part-Vane Speed Gain, Surge Offset, Surge Recovery/Prevention Orbit Limit (formerly 'Orbit Limit 1'), Surge Warning Orbit Limit (formerly 'Orbit Limit 2'), Surge Coefficients A-D, Choke Coefficients A-D.

2. Modify as necessary.

13 Compressor Commissioning Tool

The *Compressor Commissioning Tool* is used to view, modify, and commit site-specific compressor parameter values of a connected compressor, as well as to import and export such configurations between portable files. Minor guidance is provided by presenting any number of configuration 'pages', which are necessary for consideration during the deployment of a compressor system, and by displaying basic coverage/flow indications.

This tool can be used to import commissioning configuration from a file, adjust commissioning parameters requirement steps, export a commissioning value configuration to a file, sign an existing configuration file, export commissioning parameter values to a connected compressor, and create a commissioning report.

NOTE
The *Compressor Commissioning Tool* requires exclusive application focus - all other tools may be closed or hidden when starting this tool.

13.1 Accessing the Compressor Commissioning Tool

- Once connected, select the **Compressor Commissioning icon** from the *SMT Suite Launcher Strip*.

Figure 71 Compressor Commissioning Tool Icon

The *Compressor Commissioning* window displays:

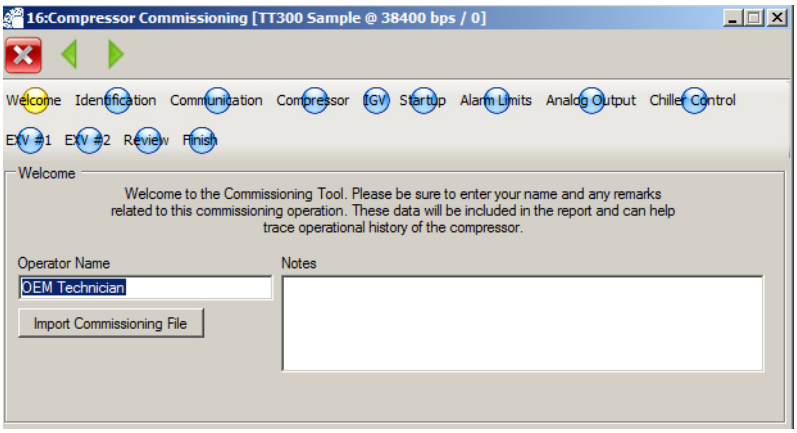


Figure 72 Compressor Commissioning Window

13.2 Importing a Commissioning Configuration from a File

To import a commissioning configuration from a file:

1. From the *Commissioning Configuration* window, click the **Import from File** button.

2. Select a **commissioning file** The commissioning parameters will be loaded and a notice is displayed indicating whether or not the file contains the signature of a DTC Trusted Official.

NOTE
If a file contains the signature of a DTC Trusted Official (i.e. is 'signed'), it can be regarded as an authentic document created by personnel recognized by DTC.

13.3 Adjusting Commissioning Parameters Requirement Step

To adjust the Commissioning parameters requirement step:

- Click any of the **graphical commissioning section flow item representation buttons** (colored circle with text name) in the flow items toolbar or click the **Next** or **Prev** buttons along the top toolbar.

NOTE
An orange button means the item has been visited, a blue is button is an unvisited item, and yellow is the current item.

The selected section will appear below in the *Commissioning Section* display

13.4 Exporting a Commissioning Values Configuration to a File

To export a commissioning values configuration to a file:

1. From the *Commissioning Configuration Finish* window, click the **Export to File** button.

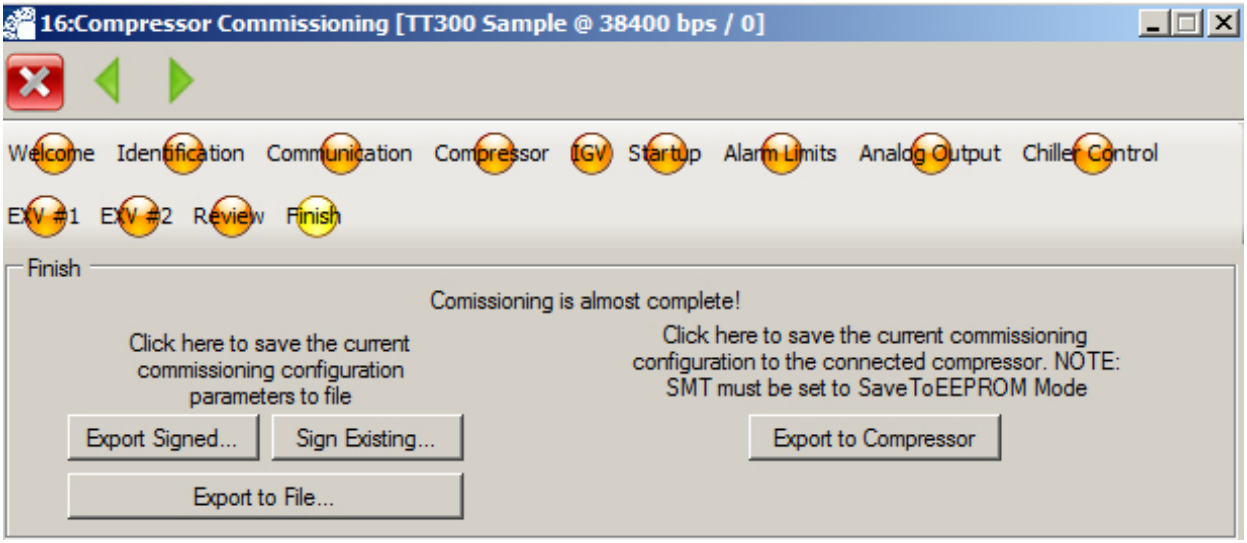


Figure 73 Compressor Commissioning Finish Window

2. Select a **file destination**.

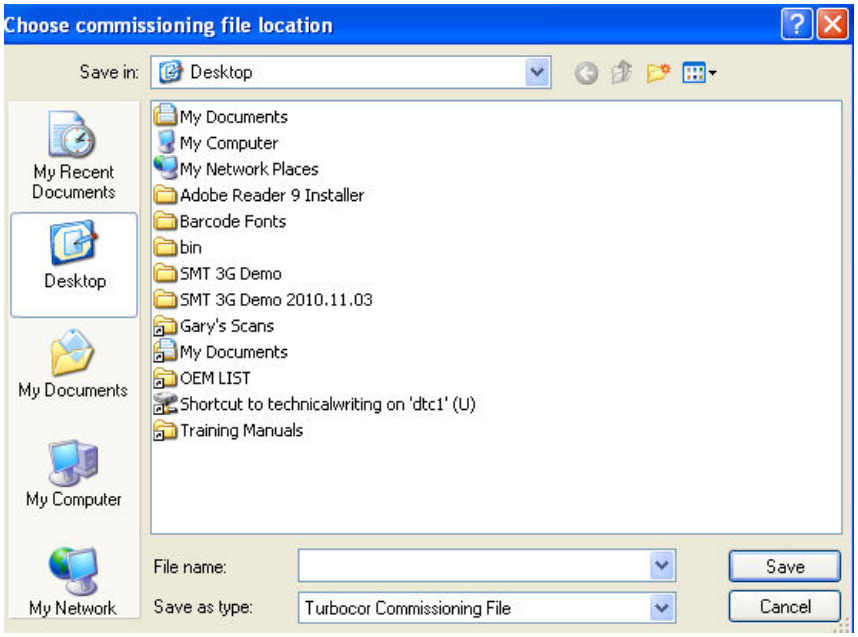


Figure 74 Choose Commissioning File Location

3. Click **Save**. The commissioning parameters and values are saved.

13.5 Signing an Existing Commissioning File

NOTE
This option is only available to DTC Trusted Officials who have been issued a recognized private key file.

To sign an existing commissioning file:

1. From the *Commissioning Configuration* window, click the **Sign Existing File** button.
2. Select the **file to sign**.
3. Select your **private key** file.

   A signature which is unique between that specific file and the signer's key will be appended to the file.

13.6 Exporting Commissioning Parameter Values to a Signed File

NOTE
This option is only available to DTC Trusted Officials who have been issued a recognized private key file.

To export commissioning parameter values to a signed file:

1. From the *Commissioning Configuration* window, click the **Export to Signed File** button.
2. Select a **file destination**.
3. Select your **private key file**.

   The commissioning parameters and values will be saved and a signature unique between that specific file and the signer's key will be appended to the file.

13.7 Exporting Commissioning Parameters to a Connected Compressor

- Click the **Export to Compressor** button.

  All parameters will be updated on the connected compressor .The progress of the export can be gauged by the progress bar directly below the button. A notification of completion will be displayed when finished.

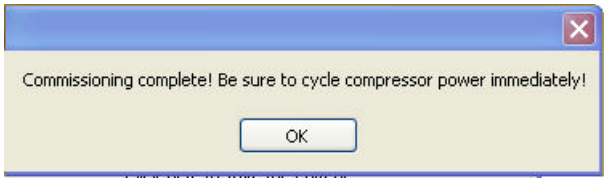


Figure 75 Commissioning Complete

NOTE
The *Parameter Saving* selection in the *Connection Manager* must be set to **RAM & EEPROM** to enable the option to **Export to Compressor**.

13.8 Creating a Commissioning Report

To create a commissioning report:

When commissioning is completed, a prompt displays asking if you would like to create a report:

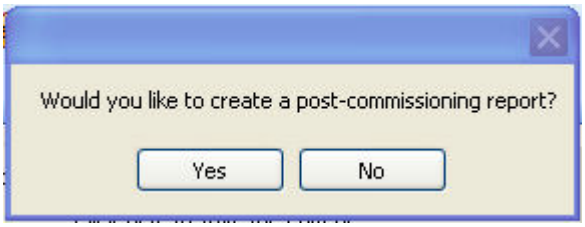


Figure 76 Report Prompt

1. Click **Yes.** A *Save As* window displays.

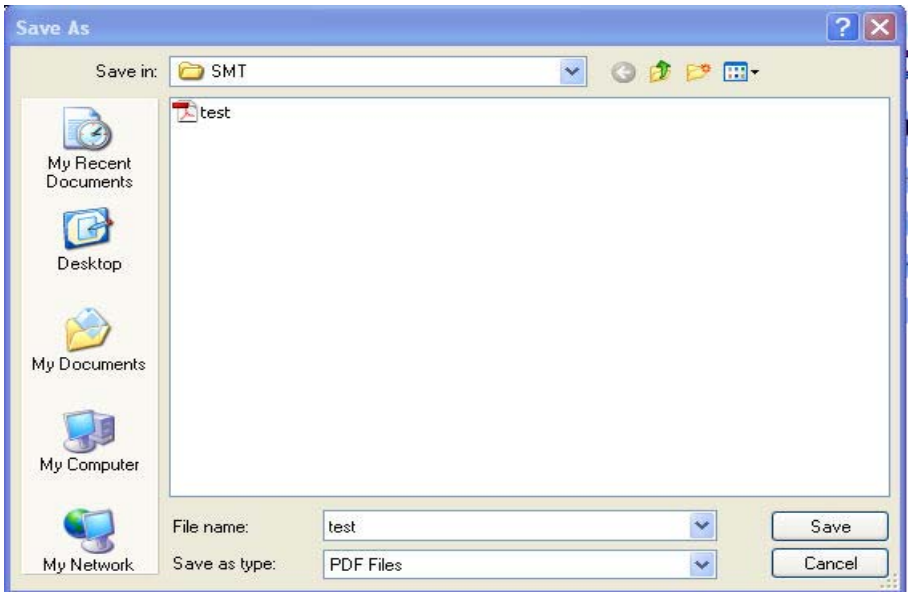


Figure 77 Report Save As Window

2. Enter a **filename and path** to which the report will be saved.
3. Click **Save.**

   A report is generated and saved to the user-specified path.

14 Compressor Data Trending Tool

The *Compressor Data Trending Tool* is used to graphically monitor selected compressor parameter values and load or save user-configurable watch configurations. This tool can be used to add or remove parameters for graphical monitoring, select the plot color of a specific parameter, start or stop graphical monitoring, reset plot data, save plot data to CSV file, load saved or pre configured watch groups, delete saved or pre configured watch groups, or save the active watch configuration for later recall.

14.1 Accessing the Compressor Data Trending Tool

- Once connected, select the **Compressor Data Trending icon** from the *SMT Suite Launcher Strip*.

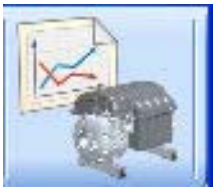


Figure 78 Compressor Data Trending Tool Icon

The *Compressor Data Trending* window displays:

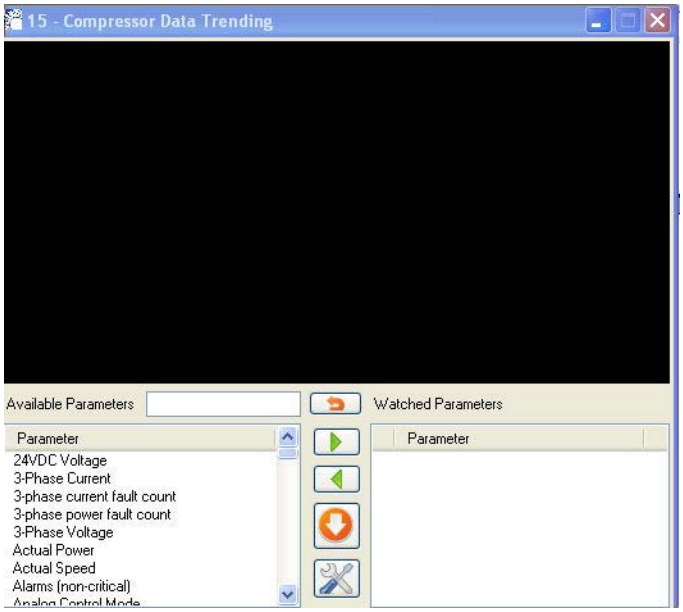


Figure 79 Compressor Data Trending Window

14.2 Adding Parameters for Graphical Monitoring

To add or remove parameters for graphical monitoring:

1. From the *Compressor Data Trending* window, in the *Available Parameters* listing, scroll to the **desired parameter.**

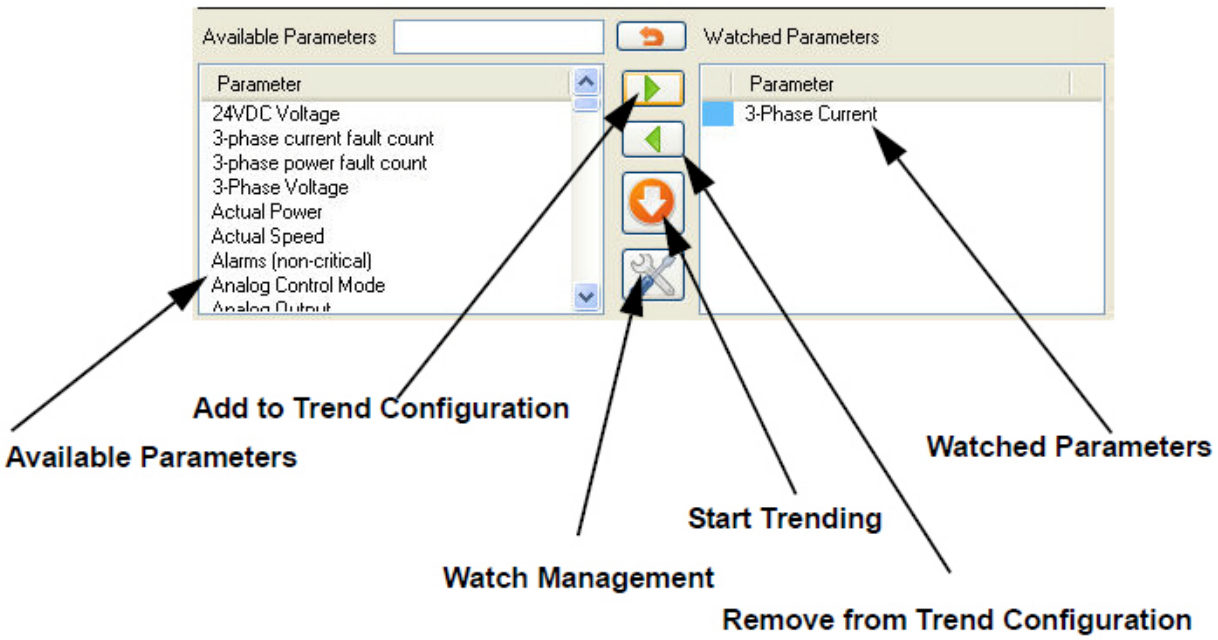


Figure 80 Compressor Trending Window - Parameter Pane

NOTE
You can enter a partial query in the *Available Parameters* text box above the listing to filter the visible parameters.

NOTE
Clicking inside the listing and typing the first few letters of the name can help speed up finding the parameter to select.

2. Double-click on the **desired entry** or click the **Add to Trend Configuration** button (refer to Figure 80).

The parameter is removed from the *Available Parameters* listing and added to the *Watched Parameters*. listing.

NOTE
A maximum of eight watched parameters is allowed.

NOTE
This operation is not available when plotting is active.

14.3 Removing Parameters from Graphical Monitoring

To remove parameters from graphical monitoring:

1. From the *Compressor Data Trending* window, in the *Watched Parameters* listing, select the **desired parameter.**

2. Double-click on the **desired entry** or click the **Remove from Trend Configuration** button (refer to Figure 80).

   The parameter is removed from the *Watched Parameters* listing and is added to the top of the *Available Parameters* listing.

NOTE
This operation is not available when plotting is active.

14.4 Selecting the Plot Color a Specific Parameter

To select the plot color of a specific parameter:

1. From the *Compressor Data Trending* window, in the *Watched Parameters* listing, click on the **colored square immediately to the left of the name of the parameter** whose plot color is to be changed. A color selection dialog displays.

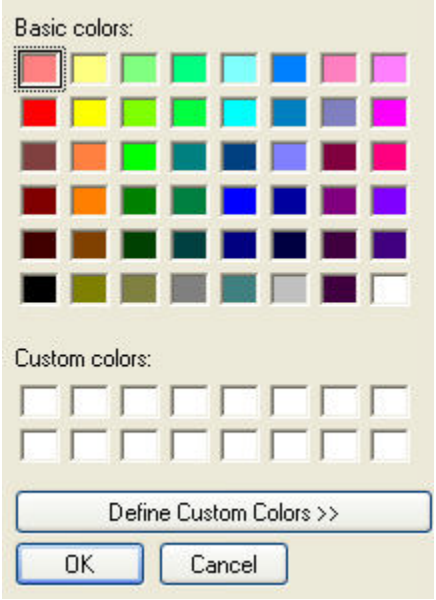


Figure 81 Parameter Color Selection

2. Select a **new color** and click **OK**. The color square in the listing will update as will the color of the appropriate plot line (if plotting is active).

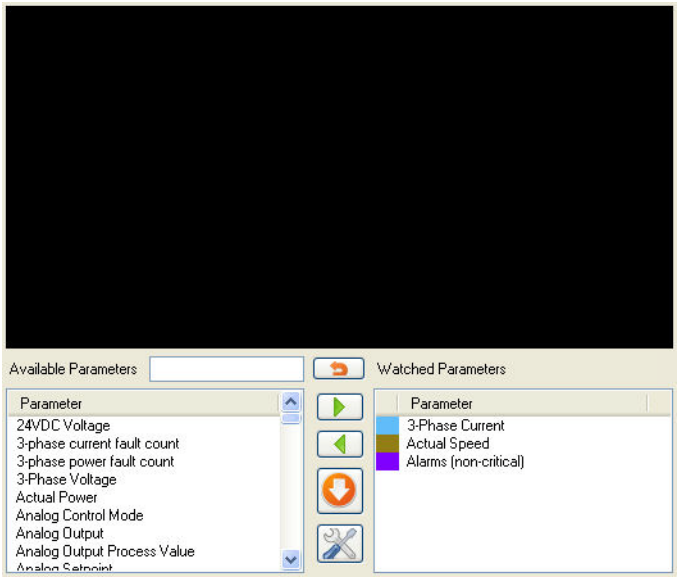


Figure 82 Watched Parameters After Color Change

14.5 Starting Graphical Monitoring

- To start graphical monitoring, from the *Compressor Data Trending* window, click the **Start Plotting** button (orange button with down arrow). Plotting begins.

  The *Start Plotting* button will change to the *Stop Plotting* button.

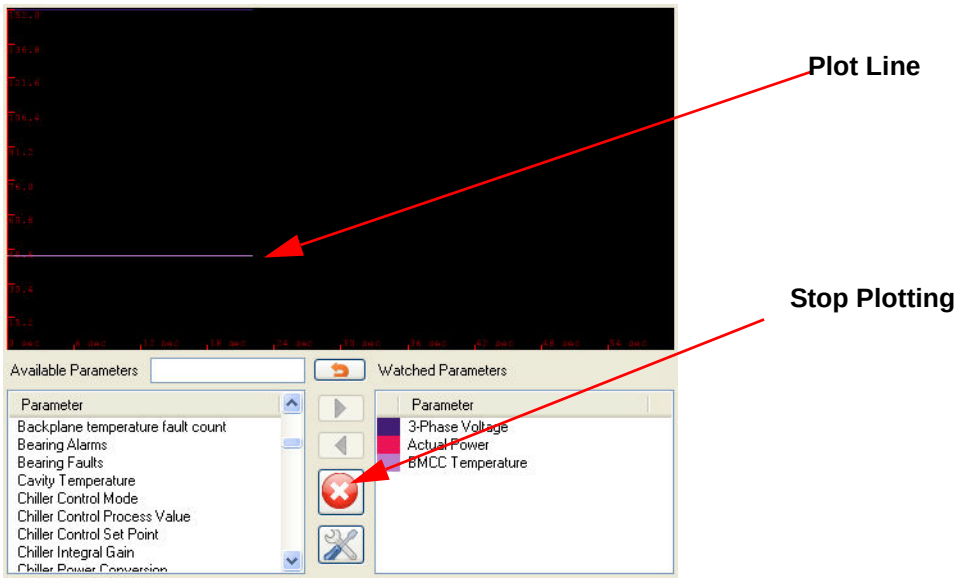


Figure 83 Watched Parameters Being Plotted

14.6 Stopping Graphical Monitoring

To stop graphical monitoring:

1. From the *Compressor Data Trending* window, click the **Stop Plotting** button (see Figure 83).

   A prompt confirming that you want to stop plotting displays.

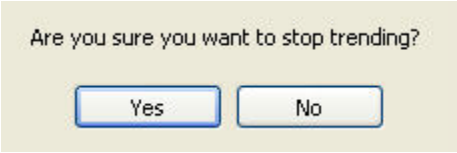


Figure 84 Stop Plotting Dialog Box

2. Select **Yes** to stop plotting. You are prompted as to whether you would like to save the data to a file.

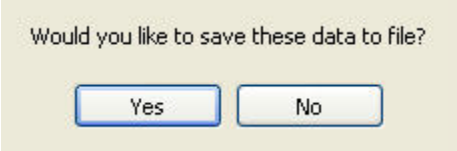


Figure 85 Save Data Prompt

3. Select **Yes** to save a CSV (Excel) file.

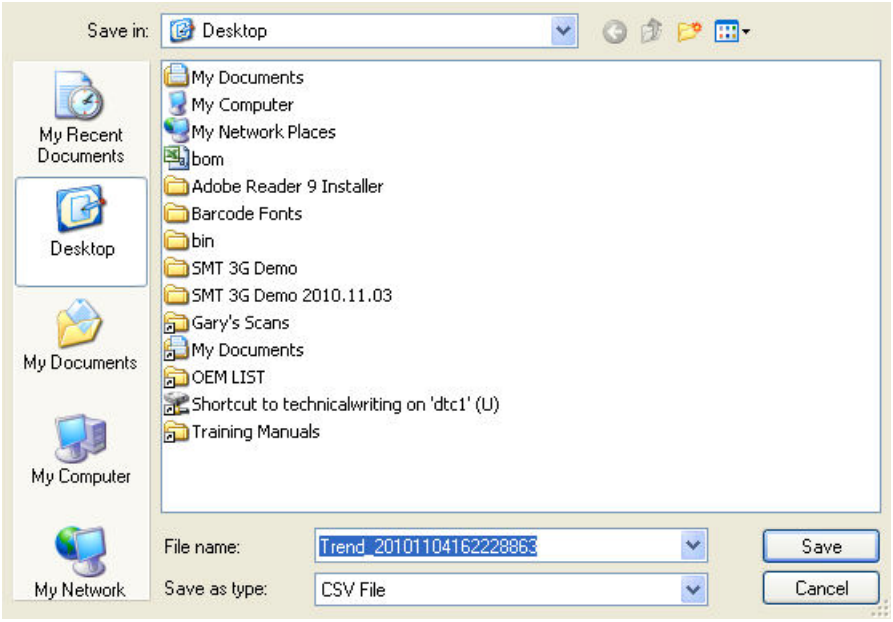


Figure 86 Save Data to a CSV File

4. Enter the **destination file name** and all trend data will be recorded to the specified file in CSV format.

NOTE
You will also receive the *Save As* prompt if a compressor connection is lost or you are disconnected.

14.7 Resetting Plot Data

- To reset plot data, click the **Reset Plots** button (orange curl-arrow).

  All plots will be reset and the graph may momentarily clear.

NOTE
When resetting the plots, data recorded before resetting will not be saved to file if this option was selected when plotting was stopped.

14.8 Saving Plot Data to a CSV File

To save plot data to CSV file:

1. After stopping, a prompt asking whether the user would like to save the trend data to file displays. Select **Yes** to save data to a CSV file.

   A *Save As* window displays (see Figure 86).

2. Enter the **destination file name** and all trend data will be recorded to the specified file in CSV format.

NOTE
You will also receive the *Save As* prompt if a compressor connection is lost or you are disconnected.

14.9 Loading a Saved or Pre configured Watch Group

To load a saved or pre configured watch group:

1. From the *Compressor Data Trending* window, click the **Manage Watch Configurations** button.

Figure 87 Managed Watch Configurations Button

The *Watch Management* window displays.

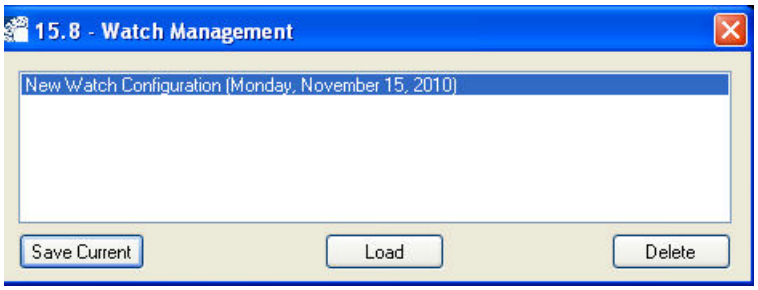


Figure 88 Watch Management Window

2. Select the desired watch configuration (if any exist) from the listing.

3. To load the selected watch configuration, either **double-click the item in the listing** or click the **Load** button.

   The watch configuration will display in the *Watched Parameters* listing on the main form and each item's plot color will be adjusted as saved.

14.10 Deleting a Saved or Pre configured Watch Group

To delete a saved or pre-configured watch group:

1. Click the **Manage Watch Configurations** button (wrench & screwdriver).

   A watch configuration management form displays.

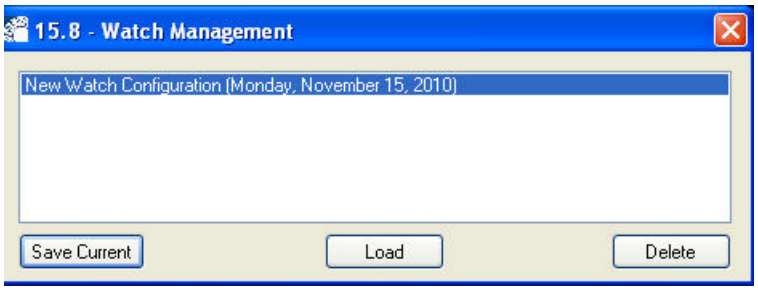


Figure 89 Watch Management Window

2. Select the **desired watch configuration** (if any exist) from the listing.

3. Click **Delete**. A prompt verifying whether you really want to delete the selected watch configuration displays.

4. Select **Yes** to remove the watch configuration.

14.11 Saving the Active Watch Configuration for Later Recall

To save the active watch configuration for later recall:

1. Add **at least one parameter** to the *Watched Parameters* listing.

2. Click the **Manage Watch Configurations** button (wrench & screwdriver).

   A watch configuration management form displays.

3. Click the **Save Current** button. A form requesting a name for the watch configuration will appear

4. Enter a name and click **OK** to save the current watch configuration

15 Remote Serial Multiplexer

The Remote Serial Multiplexer is a supplemental application which allows for one or more TCP clients to pass Modbus messages between a single serial port. It can handle some special messages which are used for completing remote operations, such as opening a host serial port, retrieving host device information, detection, etc; in addition to acting as a pass-through for Modbus messages. When the application accepts a TCP connection, a session is created which is used for handling messages between the host and client, and is destroyed when the TCP connection is terminated. A connection session may have up to one serial port association at a time, which can either be negotiated using special messages or automatically assumed if a current association matches the requested slave address. Additionally, serial port communication and TCP communication can optionally be recorded to the log file for troubleshooting purposes.

15.1 Settings

- ServerAddress: The host IP address or hostname to use for hosting

  Default: any or 0.0.0.0

- ServerPort: The host IP port to use for hosting

  Default: 502

- log_local: Indicates whether serial messages are to be logged

  Default: false

- log_remote: Indicates whether remote (TCP) messages are to be recorded to the log file

  Default: false

15.2 Configuration File

To specify a configuration file, provide on the command line:

-c [filename] where [filename] is a properly-formatted XML document matching the XSD schema specified in the design document

Multiple PC Serial Ports with Multiple Compressors

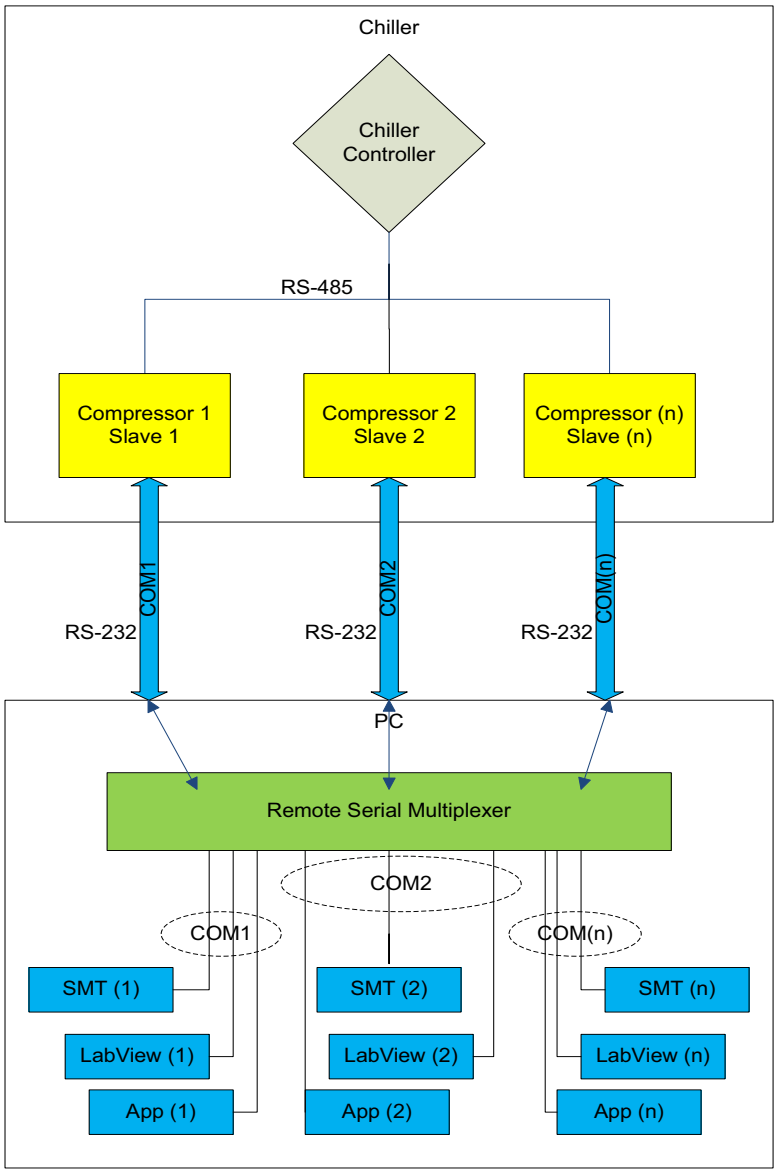


Figure 90 Multiple Serial Ports with Multiple Compressors

Single PC Serial Port with Multiple Compressors

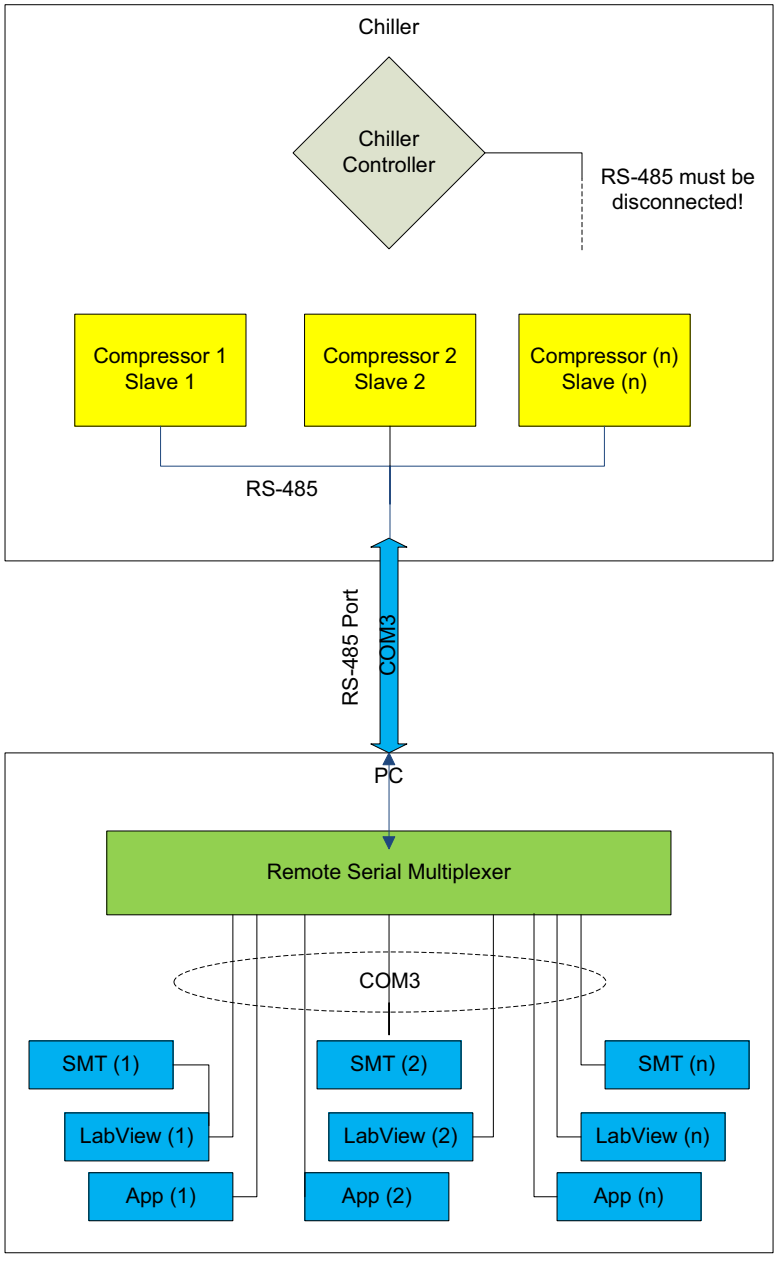


Figure 91 Single PC Serial Port with Multiple Compressors

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